

PSYCHOLOGICAL ASPECTS OF ATOPIC DERMATITIS

By

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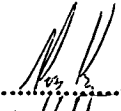
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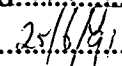
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This thesis contains no material which has been accepted for the award of any other higher degree or graduate diploma in any tertiary institution and that, to the best of the candidate's knowledge and belief, the thesis contains no material previously published or written by another person, except when due reference is made in the text of the thesis.

Signed.....

Date.....

I saw two sitting, propped like a couple of pans  
Set to warm by the fireside, back to back,  
and blotched from head to foot with scabs and blains.

And I ne'er saw curry-comb plied by ostler's jack  
Or groom, in a frenzy because his master's waiting,  
Or because he is kept up late and wants to pack

Bedwards, to match the furious rasping and grating  
With which they curried their own hide with their nails,  
Maddened by the itch that finds no abating.

The nail went stripping down the scurfy shales,  
Just as a scullion's knife will strip a bream,  
Or any other fish with great coarse scales.

Dante  
The Divine Comedy: Hell  
(Canto XXIX)

Atopic dermatitis is a chronic fluctuating skin disease which usually has an onset between two and six months after birth. During exacerbations, the lesions become widely disseminated; redness, oedema, weeping, crusting, excoriations, and fissures are the distinctive features. The pathogenesis of atopic dermatitis is not clearly understood. Genetic, environmental, physiological, immunological, and psychological factors have all been implicated. Emotional stress, personality structure, psychophysiological abnormalities, and learned behaviour have been advanced as mechanisms by which psychological factors affect atopic dermatitis. This thesis examines the first three of these areas.

Retrospective interview studies have found that emotional stress precipitates exacerbations of atopic dermatitis in approximately 70 % of cases but studies utilising life events and daily hassles as measures of stress have not found evidence of an association. In the first study reported of this thesis, 50 atopic dermatitis sufferers completed a daily diary for a fortnight, recording their emotional state and skin condition. Both self-report of interpersonal stress and depression were significantly related to changes in the skin condition. Lag sequential analyses indicated that interpersonal stress on Day X predicted skin condition on Day X+1 and that this relationship was reciprocal. The second study examined the relationship between stress and skin symptoms in 13 atopic dermatitis sufferers sitting university examinations. Again, a significantly positive relationship was found. A preliminary study of appraisal and coping processes associated with examinations was conducted utilising multiple regression analysis in order to determine their relationship to skin symptoms.

The literature on the relationship between personality features and atopic dermatitis was reviewed and a meta-analysis of suitable studies conducted. Based on the results of this review and meta-analysis, a study was performed in which 50 atopic dermatitis sufferers recruited from the general community were compared to 20 subjects with ichthyosis; also from the community; and 35 skin disorder-free controls on a range of personality and emotional state measures. The atopic dermatitis sufferers were divided on the basis of whether subjects believed that stress affected their symptoms. The "nonstress" atopic dermatitis sufferers were found to score lower on neuroticism than all other groups. They also reported less trait anxiety, lower emotional dependence on others, and a more internal locus of control with regard to control over social systems than the "stress" atopic dermatitis sufferers. No other differences existed between the groups, with the exception of the fact that the ichthyosis sufferers were significantly more able to assert their autonomy, and less conforming in their responses to frustrating circumstances. However, the skin disorder control group was noted to have a higher level of neuroticism than published



norms. The use of subjects recruited from the community and the moderate to high correlations between many of the measures were discussed in the interpretation of the results.

In the final study, differences in autonomic nervous system reactivity were examined. Eleven atopic dermatitis sufferers were compared with ten age and sex matched controls on a number of tasks such as relaxation, a video game, and mental arithmetic. Reactivity on physiological variables such as heart rate, arm skin temperature, finger blood volume, and skin conductance level were assessed across the tasks. The atopic dermatitis sufferers were found to be more reactive on mental arithmetic, a task that is known to lead to sympathetic nervous system arousal. This finding is consistent with previous research. Further analysis indicated that the two groups displayed a different pattern of reactivity across time for finger blood volume and arm skin temperature, and a close to significant difference for heart rate. Of particular interest was the finding that the atopics showed a rise in skin temperature at the site of affected skin, while the controls showed a continued fall in temperature at a matched site. Therefore, this study provided partial support for the existence of increased sympathetic reactivity in atopic dermatitis as well as partial support for the existence of symptom specificity.

Findings from all studies were integrated into past research as well as the three psychobiological conceptions of atopic dermatitis and Lipowski's biopsychosocial conception of psychosomatic medicine. Further extensions of this work were suggested.

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**CHAPTER 1**  
**INTRODUCTION.**

### *Definition*

Atopic dermatitis is a chronic fluctuating skin disease which usually has an onset of between 2 and 6 months of age. The disease can, however, first appear as late as 50 years of age (Champion & Parish, 1986). During periods of exacerbation, the lesions become widely disseminated and the features are redness, oedema, weeping, crusting, excoriations, and fissures (Kepecs, Rabin, & Robin, 1951). Lichenification as a result of constant scratching is a common feature. This is a reddened, pigmented, scaly, thickened, and sharply demarcated patch of skin in which the normal lines of the skin are greatly exaggerated. Of primary significance is the itchiness or pruritic nature of the lesions. Affected areas of the skin itch more readily when stimulated by itch-inducing agents such as histamine and proteolytic enzymes. Exogenous factors such as heat, perspiration, wool, dust, and individual food ingredients have been shown to create pruritus in affected areas. These areas may also respond to stimuli that are normally felt as touch with sensations of itchiness. The consequence of this is the perpetuation of damage through a vicious "itch-scratch cycle" to the point where it is difficult to determine which lesions are primary and which are due to scratching (Arayata, 1986; Champion & Parish, 1986). The lesions, therefore, tend to be situated on areas accessible to the fingers and that are subject to irritation from sweating or clothes, such as the nape of the neck, the arm, thighs, joints, face, and ano-genital region (Robertson, Jordan, & Whitlock, 1975).

Three stages of the disorder are commonly described. In the infantile stage, the major characteristic features are erythema of the cheeks and oedematous papules which due to their itchiness are scratched to the point of becoming exudative and crusted. Similar lesions can occur on the body and limbs. From 18 months onwards; the childhood stage; the lesions are most often situated at the elbow and knee flexures, sides of the neck, wrists and ankles. The lesions are more lichenified than those occurring in the infantile stage. Often true eczematous lesions in discoid patches of vesiculation occur as well. The pattern of the adult stage is similar to that of late childhood with either widespread lesions on the face, upper arms and back; possibly associated with areas of maximum sweating; or localised areas of lichenification. During quiescent periods, the skin is dry and lesions consist of thick, excoriated, slightly scaling plaques (Champion & Parish, 1986; Kepecs, Rabin, & Robin, 1951).

### *Terminology*

The modern concept of eczema or atopic dermatitis was first described by Besnier in 1892 as a skin disease usually starting in childhood which led to intense itching. He believed that the disease was incurable, was subject to spontaneous remissions, and correctly recognised its frequent association with asthma. Besnier referred to the disease as prurigo diathésique (Kepecs, Rabin, & Robin, 1951). Since then, many terms have been used to describe the condition including: Besnier's

prurigo, disseminated neurodermatitis, diathetic eczema, generalised neurodermite, lichen simplex chronicus disseminatus, Spätexudativ Ekzem, allergic eczema, flexural eczema, infantile eczema, and atopic eczema (Champion & Parish, 1986; L. Solomon & Beerman, 1966).

The two most common terms in use today are eczema, as in allergic eczema or atopic eczema, and atopic dermatitis. The word "eczema" seems to have originated in AD 543 and is derived from the Greek "ekzeim", meaning to "boil out" or "to effervesce" (Domonkos, Arnold, & Odom, 1982). This term is inappropriate, though, as true eczematous changes are not always present, and allergic eczema is misleading in terms of aetiology (Champion & Parish, 1986). The term "atopy" was coined by Coca in 1923 and means "strange" or "out of place". It was used to group together a range of diseases, including asthma and hay fever, that occurred spontaneously in individuals who had a family susceptibility (Champion & Parish, 1986). Sulzberger introduced the most widely accepted term "atopic dermatitis" in 1933, indicating the association of the disorder with the others of the atopy grouping (L. Solomon & Beerman, 1966). This grouping was supported by the finding Ishizaka and his colleagues in 1966 that the skin sensitizing (reaginic) antibodies which belonged to the IgE class of immunoglobulins were associated with the atopic disorders (Jarrett, 1973).

### *Incidence*

The incidence of all the atopic disorders has been estimated to be between 2 and 20 % of the population (Champion & Parish, 1986). According to Rajka (1975), atopic dermatitis afflicts between 0.1 and 0.5 percent of the population, however, about three percent of all infants suffer from the disorder (Walker & Warin, 1956). The length of time that an individual is afflicted with atopic dermatitis varies greatly. Kesten (cited in Roth & Kierland, 1964) followed 200 infantile cases for seven years; at the end of this time, only 20 % still had the disorder. Purdy (1953) followed up 93 infantile cases for a 15 to 21 year period and found only 28 % remained afflicted. Norlind (cited in Roth & Kierland, 1964) found that only 6 % of his patients still suffered after the age of 35 years. In Roth and Kierland's (1964) 20 year follow-up of 492 sufferers, the average duration of atopic dermatitis was 32 years for severe cases, with a range of 2 to 66 years, and an average of 27 years for mild cases, with a range of 1 to 63 years. However, in a review of Roth and Kierland's (1964) study Baer and Kopf (cited in L. Solomon and Beerman, 1966) pointed out that the patients in this series were likely to be more severe in their symptomatology than cases treated by ordinary physicians. Musgrove and Morgan (1976) followed up 99 cases that had attended a dermatology department. The patients were recontacted after 15-17 years and it was found that 47 patients still suffered from symptoms at the time of examination and that another 10 reported they suffered from outbreaks. Those cases

that had been severe or fairly severe at the time of their original contact were twice as likely to show a persistence of symptoms.

#### *Associated disorders*

Hayfever and asthma occur in 30-50 per cent of sufferers, although the age of onset is later than the eczema. In other cases, latent asthma can be detected by bronchial inhalation tests. For those sufferers with both eczema and asthma, the two disorders may fluctuate together, alternately, or quite independently (Champion & Parish, 1986). At the time of their initial interview of their 492 cases of atopic dermatitis, Roth and Kierland (1964) found that 33 % also suffered from asthma, 30 % from hayfever, 15 % from allergic rhinitis, 15 % from urticaria, and 4 % from migraines. Musgrove and Morgan (1976) found that of their 99 cases, approximately 30 % suffered from asthma, and 33 % from hayfever. They also found that there was an association between initial severity of atopic dermatitis and later development of asthma.

Other disorders associated with atopic dermatitis are anaphylactic reactions to insect stings and drug sensitivity, alopecia areata, certain viral infections such as warts, herpes simplex, and vaccinia, conjunctivitis of both an allergic and non-allergic type, and atopic cataract (Champion & Parish, 1986).

Smith (1987) found that an association existed between left-handedness and allergic disorders, including atopic dermatitis. However, Dellatolas, Annesi, Jallon, Chavance, & Lellouch (1990) found no relationship between left-handedness and allergic disorders, with the exception of a negative association between extreme right-handedness and allergic disorders, and a positive relationship between extreme left-handedness and asthma.

Recent evidence has been presented which suggests an association between affective disorders such as depression and manic and depressive episodes and allergic disorders. Nasr, Altman, and Meltzer (1981) found that in a series of 82 psychiatric patients, 16 of 48 affective disorder patients suffered from asthma or hayfever compared to only 2 of 34 schizophrenic patients. They also found a higher incidence of atopic disorders in the first-degree relatives of the affective patients compared to those of the schizophrenic patients. Garvey and Tollefson (1988) reported two cases of patients who experienced migraine and neurodermatitis preceded by affective episodes. These authors suggested that a disorder in serotonin metabolism may be responsible for the association of the disorders. A. Allen (1989) also asserted that a connection existed between atopy and affective disorder. Preston (1969) in a study of the association of depression and skin disease found 29 of 57 cases of atopic dermatitis showed obvious depression while a further 14 were masked cases. However, other skin disorders like psoriasis and seborrheic dermatitis also showed similar incidences of depression. Jowett and Ryan (1985) found that 38 % of their eczema sufferers reported experiencing feelings of depression regarding their skin

condition, while 24 % of psoriasis and 27 % of acne sufferers in their study reported such feelings. Indirect support for the association between atopic dermatitis and affective disorders comes from two studies on the effects of psychotropic medication. Lester, Wittkower, Kalz, and Azima (1962) found that of various psychosomatic skin disorders, atopic dermatitis responded with the greatest improvement upon treatment with psychotropic medication such as chlorpromazine and imipramine. Not only was there improvement in mood but there was improvement in the rash and itching in 62 % and 70 % of cases, respectively. S. Friedman, Kantor, Sobel, and Miller (1978) found that cases of neurodermatitis treated with a MAO inhibitor showed a significant lessening of pruritus, erythema, and papules.

In summary, approximately 30 % of atopic dermatitis sufferers also suffer from other atopic disorders such as asthma or hayfever, while fewer numbers tend to suffer from allergic rhinitis, urticaria, and migraines. Certain viral infections and anaphylactic reactions have also been noted. Evidence suggests an association between atopic dermatitis and affective disorders, but sufferers of other skin disorders do experience depressive symptoms. The association between left handedness and allergic disorders remains unclear.

#### Pathogenesis of Atopic Dermatitis

The pathogenesis of atopic dermatitis has not been determined at this stage. Genetic factors, environmental factors, physiological defects and altered pharmacological reactivity, immunological dysfunction, and allergic factors have all been implicated (Arayata, 1986). Psychological factors which were previously considered to be the major cause of the condition are now thought to contribute to exacerbations (Whitlock, 1976).

#### *Inheritance*

A family history is obtained in seventy percent of cases (Rajka, 1960). Roth and Kierland (1964) found that a family history of atopy was present in 66 % of their mild cases and 69 % of their severe patients. Musgrove and Morgan (1976) found a family history of atopic dermatitis in 60 % of their cases and a family history of asthma and hayfever in 55 % and 42 % of cases, respectively. Those cases without a family history do not appear to differ from the others, except that they have a better prognosis (Champion & Parish, 1986).

Though most investigators would agree that atopic dermatitis is inherited, the mode of transmission is not clear (L. Solomon & Beerman, 1966). Of the early researchers, Adkinson (cited in L. Solomon & Beerman, 1966) suggested that a recessive gene was responsible. Cooke and Vander Veer (cited in Hanifin, 1982) believed that inheritance was through a dominant gene. However, Weiner, Zieve, and Fries (cited in Hanifin, 1982) found that it could not be due to a single pair of genes, dominant or recessive. According to Snyder (cited in L. Solomon & Beerman, 1966), there may be more than one mode of inheritance.



Both Champion and Parish (1986) and Whitlock (1976) believe that transmission is polygenic in nature. The former state that clinically normal parents may have affected children, which excludes a simple dominance inheritance pattern; and in other families, both parents may be affected but the children are free, arguing against a simple recessive mode of transmission. Arayata (1986) concluded that these results suggested various modes of inheritance as well as the possibility of patterns of partial penetrance.

In commenting, Hanifin (1982) stated that studies that support a genetic basis for atopic dermatitis are imperfect. There is no genetic marker for the disorder, the studies are mostly retrospective, subject to variations in diagnostic criteria, and none use modern statistical or genetic analytical techniques. To summarise, various studies have indicated a tendency for atopic dermatitis to occur along familial lines in approximately 70 % of cases. Therefore, while it is generally accepted that a genetic basis underlies atopic dermatitis, studies utilising improved designs and techniques are needed.

#### *Environmental Factors*

Seasonal variations affect atopic dermatitis sufferers, with Rajka (1975) stating this occurred in all but 10 % of sufferers who have severe atopic dermatitis and in whom symptoms run a continuous course. Indirectly, seasonal pollens lead to aeroallergen contact. The usual pattern is deterioration in winter and improvement in summer. In Roth and Kierland's (1964) study, 40 % of mild cases and 54 % of severe cases reported deterioration in winter while 12 % of both groups reported a worsening of their condition in summer. Rajka (1975) postulated several reasons for the improvement during summer which he noted in 76 % of his cases, including better sebum and sweat secretion, exposure to the sun, reduced contact with dust mould indoors, and reduction in contact with woollen clothes. Most patients in the Roth and Kierland (1964) study stated that the difficulty in summer was due to sweating. Rajka (1975) agreed with this point and added the additional factor of exposure to summer pollens.

With regard to climate, atopic dermatitis is more common in temperate regions (Champion & Parish, 1986). Rajka (1975) also noted that sudden changes in temperature, high atmospheric pressure and strong winds could trigger episodes. In summary, the studies conducted appear to support seasonal variations in the condition and an increased incidence of the disorder in temperate climates.

#### *Physiological and pharmacological abnormalities*

##### *Physiological abnormalities*

Physiological abnormalities in atopic dermatitis have been a focus of research. A number of abnormal vascular responses have been described; these have been reviewed in Hanifin (1982). In normals, when the skin is firmly stroked with a blunt

point, the classical triple response first observed by Lewis in 1927 is found to occur. The first component, an erythematous line develops in 3 to 15 seconds along the line of stroking, and is due to dilatation of the precapillary sphincter by the action of vasodilator substances such as histamine and polypeptides (Whitlock, 1976). The "flare" response develops a few seconds after the red line and is due to the dilatation of the arterioles in an axon-reflex (Lobitz & Campbell, 1953). The third component is the "weal" response which develops one to three minutes after the red line, which it replaces. The weal is due to oedema caused by transduction of fluid from the capillaries involved in the the production of the red line (Lobitz & Campbell, 1953).

In atopic dermatitis sufferers, there is the usual red line component, but then 5 to 15 seconds after this, a white blanch extends peripherally from the scratch line. This response is known as white dermographism, is thought to be due to vasoconstriction, and lasts for two to five minutes without the wealing component (Lobitz & Campbell, 1953). This reaction is best elicited on erythematous affected skin in atopic dermatitis sufferers (Hanifin, 1982). West, Kierland, and Litin (1961) found that hypnosis did not affect the occurrence of white dermographism. They felt that the white line response was probably due to the abnormal reaction of the same mechanism that creates the red line response. They suggested that both were due to an axon reflex.

The small blood vessels in atopic dermatitis sufferers have a tendency towards vasoconstriction. Eyster, Roth and Kierland (1952) found that atopic dermatitis sufferers displayed more rapid cooling and slower rewarming of toe, finger, thorax and forehead skin temperature than controls. Abrams and Farber (1963) found they had a lower finger temperature in a warm room. Moderately and severely affected males also tended to show lower resting digital blood flow than male controls, but this difference was not observed for female subjects. Lower resting levels of skin temperature and more rapid cooling in children with atopic dermatitis has been reported (Johnson & Winkelmann, 1965). These authors did not find evidence of slower rewarming. Bystryn and Hyman (1969) found that there was a marked decrease in skin blood flow in the unaffected skin of the forearm of subjects with atopic dermatitis. They suggested that this may be due to an increase in vasoconstrictive tone, lower than normal blood pressure, or diminished number of blood vessels due to atrophy. As biopsies of atopic skin had not indicated fewer blood vessels, they discounted atrophy of blood vessels. There was no evidence to clearly support lower blood pressure and so they concluded that higher than normal vasoconstrictive tone was the cause of the decreased blood flow. Bystryn and Hyman (1969) also found that while the affected skin of atopic dermatitis sufferers showed normal levels of blood flow, skin involved in acute exacerbations may have up to five times the normal blood flow.

Abnormalities in the sweat responses of atopic dermatitis sufferers have also been noted. Sulzberger, Herrmann, and Zak (1947) found that although sweat secretion is unimpaired, deficient sebaceous gland activity leads to a reduction of surface lipids in the dry, keratotic skin. The consequence of this is not only excessive reabsorption of sweat droplets by the stratum corneum, but also parakeratotic plugging of the sweat duct ostium. This prevents sweat evaporation, and consequently there is movement of sweat through the duct wall into the epidermis or dermis, where irritants, allergens or both present in the sweat lead to pruritus (Rajka, 1975).

In summary, consistent physiological abnormalities have been found in atopic dermatitis sufferers. In particular, abnormal vascular reactions such as failure to demonstrate the triple response of Lewis and reduced blood flow in the skin and lower skin temperatures have been noted. Both of these phenomenon have been argued to be due to excessive vasoconstriction of the skin's blood vessels. In contrast, excessive blood flow in affected sites has been noted. Abnormalities in sweat responses in the form of deficient sebaceous gland activity leading to reabsorption of sweat and infiltration of sweat into the dermis or epidermis have also been reported.

#### *Pharmacological abnormalities*

Reactions to several pharmacological agents have also been demonstrated in atopic dermatitis sufferers. Lobitz and Campbell (1953) found that intradermal injection with acetylcholine or methacholine produced a paradoxical white blanched area inside the flare in atopic dermatitis skin, instead of the usual reddening. This reaction has been referred to as delayed blanch. Lobitz and Campbell thought that the response was due to vasoconstriction, while the reddened response of normal subjects was due to vasodilatation.

However, three studies suggest vasoconstriction may not be the cause of the delayed blanch reaction. First, Ramsay (1969) found that use of a photo-electric pulse meter showed that both normals and atopic dermatitis sufferers displayed a vasodilatory response. Using capillary microscopy to study vasodilatation, M. Davis and Lawler (1958) found that vasodilatation occurred in the skin of atopic dermatitis sufferers when exposed to acetlylcholine. They proposed that such exposure led to increased capillary permeability that allowed the transudation of fluid from the capillary into the area around the wheal. The accumulation of fluid created oedema and the blanch reaction.

Finally, Bystryn, Freedman, and Hyman (1969) used a tissue clearance technique with iodoantipyrene (IAP) as a tracer. The rate of removal of a fat soluble isotope such as IAP from an intracutaneous injection site reflects the total skin blood flow in the area. They found that when subjects were injected with methacoline and then IAP, there were similar rates of clearance of IAP in normal and atopic dermatitis subjects. This suggested that the area that displays the blanching has an increase in

blood flow resulting from the vasodilatation of some blood vessels. It is still unclear as to what mechanism is involved in the delayed blanch reaction, but Hanifin (1982) suggests that it probably reflects a hyperreactivity to cholinergic agents. West et al. (1961) showed that the reaction could be abolished in some subjects while under hypnosis.

Initially, it was thought that this reaction was unique to atopic dermatitis. However, West, Johnson, and Winkelmann (1962) found that injection of acetylcholine into the skin of subjects with asthma or hayfever but not atopic dermatitis led to the delayed blanch reaction in many of them. More recently, Uehara and Ofuji (1977) found that adults with allergic contact dermatitis also displayed the delayed blanch response. They also showed that the normal skin of atopic dermatitis sufferers did not display the delayed blanch reaction or white dermographism. This suggested that these abnormal reactions were secondary to the disorder rather than having some aetiological role. However, this finding needs to be reconciled with the observations of West et al. (1962) regarding the reactions of asthma and hayfever sufferers.

Warndorff (1970) showed that injection of acetylcholine lead to an increase in sweating in atopic dermatitis sufferers but while injection of the beta-adrenergic blocking agent propranolol led to an increased sweating response to acetylcholine in normals, there was no such increase in atopic dermatitis sufferers (Hemels, 1970).

Abnormal reactions to other pharmacological agents such as nicotinic acid and its esters have been noted. In normal subjects, application of these substances normally causes erythema (Hanifin, 1982). However, atopic dermatitis sufferers show either no erythema or a blanching response in 50 to 90 % of cases. This reaction only occurs in the involved skin, but also occurs in cases of allergic contact dermatitis (Uehara & Ofiju, 1977). Hanifin (1982) suggests this reaction is due to a vasoconstrictive response.

The role of histamine in atopic dermatitis responses has been investigated considerably and much of this work is reviewed by Hanifin (1982). The injection of histamine leads to a larger than normal rise in skin temperature. Of interest is the fact that the areas showing the greatest rises are the face, neck, and flexural joints, places where atopic dermatitis is most common (Williams, 1938). Hanifin (1982) states that it is uncertain whether this response reflects a greater reactivity to histamine or more efficient delivery of histamine to sites of inflammation. Eyster et al. (1952) found that intradermal injection of histamine led to the Lewis triple response in normal subjects but atopic dermatitis sufferers failed to show the flare response.

Hanifin (1982) notes that a number of researchers have found increased levels of histamine in both affected and unaffected skin of atopic dermatitis sufferers. His own research (Hanifin, cited in Hanifin, 1982) had found elevated plasma levels in

some severe cases. While this would appear to suggest a major role for histamine in the cutaneous, vascular and immunological abnormalities described, Hanifin (1982) cautions that this finding is not consistent and is a transient phenomenon in only those with extensive involvement. A number of studies quoted by Hanifin (1982) and Leung, Rhodes, and Geha (1987) have found a lower threshold of histamine release by atopic basophils, mast cells, and leucocytes. However, the aetiological role of histamine in atopic dermatitis remains unclear.

Therefore, a number of abnormal pharmacological reactions have been described. It is of interest that two of these; the responses to acetylcholine and nicotinic acid; are thought to involve abnormal patterns of vasodilatation or vasoconstriction of the peripheral blood vessels. As the physiological abnormalities in atopic dermatitis also indicated abnormal vascular reactions, the underlying relationship between these two areas requires further consideration.

#### *Immunological Factors*

In the 25 years since the findings of Ishizaka and his colleagues concerning the association of the atopic disorders to the skin sensitizing (reaginic) antibodies of the IgE class of immunoglobulins, much research has been directed towards understanding the immunological status of atopic dermatitis sufferers (for reviews, see Byrom & Timlin, 1979; Clark, 1989; Hanifin & Lobitz, 1977). These studies can be roughly organised into four categories: defects of humoral immunity; abnormalities of cell-mediated immunity; associations with immunodeficient states; and cyclic nucleotide states (Hanifin & Lobitz, 1977). In summary, these studies indicate that the two main immunological defects in atopic dermatitis are decreased amounts of cyclic AMP in stimulated cells, and immune deficiency in the form of decreased numbers and reduced function of T lymphocytes. Reduced function of T lymphocytes, however, is associated with below normal amounts of cyclic AMP on stimulation, so the two effects are not unrelated. While there are increased amounts of IgE, immunoglobulin levels are normal, as a whole (Champion & Parish, 1986).

#### *Immunoglobulins and allergy (IgE mediated hypersensitivity)*

The main immunoglobulin abnormality is increased serum total IgE and specific IgE antibody to ingested or inhaled antigens. About 80 % of patients with atopic dermatitis have increased amounts of total IgE. Any increase, however, depends upon coexisting atopic disorders and the severity of the dermatitis. If dermatitis is the only clinical manifestation of atopy, the amounts of IgE may be only marginally above the normal range. If there is concomitant asthma or allergic rhinitis, the concentrations of IgE may be very much above normal. IgE also increases in amount with increasing severity or extent of the dermatitis and those patients with high levels are likely to have a poorer prognosis (Champion & Parish, 1986).

Increased amounts of IgE have also been found to be related to the depressed or decreased delayed hypersensitivity responses determined by skin tests or by *in vitro* lymphocyte activities. Decreased numbers of T suppressor cells, determined as Ty or as OKT8, show an inverse correlation to the total amount of serum IgE (Champion & Parish, 1986).

The clinical evidence that IgE-mediated hypersensitivity is not fundamental in the aetiology of atopic dermatitis is summarised by Champion and Parish (1986) as follows:

1. Normal persons may have IgE to similar antigens, though usually in lesser amounts.
2. Persons with other atopic disorders may have similar amounts of total IgE and specific IgE to defined antigens, as seen in atopic dermatitis, but do not have atopic dermatitis.
3. Persons with atopic dermatitis may have no detectable IgE.
4. IgE-type antibody-antigen reactions induce transient weals and not dermatitis, which is classically a manifestation of delayed hypersensitivity.
5. Treatment along allergic principles by avoidance or specific desensitization is seldom very helpful.

Despite the above, Clark (1989) concludes that research, particularly that on food ingestion and aeroallergen contact initiated flares, indicates that IgE-mediated immediate and late-phase reactions play a major role in the development of atopic dermatitis. For example, he cites recent research that indicates that IgE-mediated reactions occur at the site of active atopic dermatitis. Other examples of recent research cited by Clark (1989) are the fact that T-helper cell subtypes found in atopic dermatitis resemble a form found in the mouse that produces interleukin-4, which facilitates IgE production and mast cell proliferation; mast cells are double in density in the skin of atopic dermatitis sufferers compared to normals. Therefore, while raised levels of IgE are a feature of the clinical presentation, the role of IgE-mediated immunity in atopic dermatitis is still unclear. There is still dispute as to whether these abnormalities reflect a major role for IgE in the pathogenesis of the disorder.

#### *IgG, IgA, IgM*

The amounts of IgG, IgA, and IgM are usually normal, but increases have been reported, particularly in severely affected persons. It appears that for those individuals with severe eczema which is complicated by cutaneous infection, any increase in IgG is due to antibodies to bacteria or, in some cases, food antigens. Any change in total IgG is considered to be a secondary or unrelated phenomenon and is not contributory (Champion & Parish, 1986).

It has been suggested by some researchers that atopic subjects may have an IgA deficiency that allows excessive absorption of allergen through mucosae, which results in increased formation of IgE. This hypothesis was later modified to propose that the IgA deficiency may exist only for a few months in early infancy and that the increased allergen absorption primed the individual to excessive formation of IgE later in life. There is some evidence that serum total IgA is low in the first months of life of infants who subsequently develop atopy, though results are not consistent. In summary, most of the evidence argues against an association of reduced amounts of IgA and atopy in adults. Similarly, IgG appears to be secondary to the disorder rather than playing a role in pathogenesis (Champion & Parish, 1986).

#### *Cell-mediated immunity*

As well as humoral immunity defects, there is evidence to suggest that atopic dermatitis sufferers have dysfunctional cell-mediated immunity. There appears to be depression of T-cell function with an increased susceptibility to viral, bacterial, and fungal infections. Of these, herpes simplex, vaccinia, viral warts, *Staphylococcus aureus*, and *Trichophyton rubrum* infections are the most common. There is, however, less susceptibility to impetigo, toxic epidermal necrolysis, or furunculosis. There is also decreased reactivity to other common allergens such as poison ivy, *Candida*, and dinitrochlorobenzene (DNCB) (Ryan, 1987).

There has been demonstrated a close association between atopic dermatitis and decreased numbers of circulating rosette forming T-cells, and a depression in these cells' ability to respond to such mitogens as phytohemagglutinin (PHA) and concanavalin A (CON A) (Arayata, 1986). There are decreased numbers of mature T lymphocytes in atopic dermatitis sufferers, particularly those T lymphocytes with suppressor / cytotoxic functions. It is this lowered number of mature suppressor subset of T-cells that may lead to the raised IgE levels as depletion of T-cells in rats leads to increased production of IgE, but no firm evidence exists as yet (Champion & Parish, 1986).

Decreased number of lymphocyte natural killer cells and an increased proportion of B lymphocytes with surface bound IgE have also been found in atopic dermatitis (Champion & Parish, 1986). This latter finding is consistent with raised serum IgE levels (Byrom & Timlin, 1979). To summarise, a number of deficits in cell-mediated immunity exist, particularly with regard to depression of T-cell functioning. Furthermore, there are decreased numbers of lymphocyte natural killer cells and increased B lymphocytes with surface bound IgE. These deficits appear to be consistent with the raised IgE levels described in the section on IgE mediated hypersensitivity.

### *Atopic dermatitis and immunodeficiency diseases*

The association between immunodeficiency diseases and skin disorders similar to atopic dermatitis also suggests the importance of immunological factors in the course of the disorder. The x-linked recessive disorder Wiskott-Aldrich syndrome shows an association between dermatitis and abnormal reactions to infection and thrombocytopenia. Dermatitis has also been reported to occur in association with ataxia-telangiectasia, agammaglobulinaemia, Hurler's syndrome and anhidrotic ectodermal dysplasia (Champion & Parish, 1986). Hanifin and Lobitz (1977) also noted the occurrence of eczema in patients with hyper-immunoglobulin-E syndrome. Ryan (1987) included DiGeorge and Nesselof syndromes which also have high levels of IgE and decreased cell-mediated immunity as disorders in which an atopic eczema-like syndrome occurs. Many of these disorders also display decreased cell-mediated immunity and raised IgE levels (Ryan, 1987) but the significance of this fact with regard to the aetiology of atopic dermatitis remains unclear.

### *Cyclic nucleotide activity*

Szentivanyi (1968) proposed that the fundamental defect in the atopic disorders was one of disordered physiological and pharmacological reactivity. He believed that there existed an imbalance of the normal regulatory control of alpha-adrenergic and beta-adrenergic stimulation due to the blockade of the beta-receptors. This leads to a reduction in the capacity to synthesise cyclic AMP and increased alpha-receptor stimulation. Immunological reactions, infections, and chemical, physical, and psychological stimuli might all be capable of affecting this reactivity (Hanifin & Lobitz, 1977).

While studies reviewed by Hanifin and Lobitz (1977) show no abnormalities in levels of adenyl cyclase, phosphodiesterase, or cyclic AMP-dependent protein kinase in the skin of atopic dermatitis sufferers, there is evidence that supports the beta-adrenergic blockade theory. R. Carr, Russe, and Reed (1973) found that when cutaneous cells of atopic dermatitis sufferers were treated with a beta-adrenergic agonist, catecholamines, there was not the decrease in DNA synthesis seen in cells of normal people. This indicated that the inhibition of DNA synthesis is a beta-adrenergic effect, and that the lack of reaction by the atopic dermatitis specimens was due to beta-adrenergic blockade.

Research reviewed by Champion and Parish (1986) indicated that lymphocytes and neutrophils of atopic dermatitis sufferers that are treated with beta-receptor agonists show decreased cyclic AMP responses and T-lymphocyte maturation and function, which is dependent on cyclic AMP levels. Decreased T-lymphocyte maturation is a major cell-mediated immunity defect noted in atopic dermatitis sufferers. Byrom and Timlin (1979) have suggested this may be particularly true for a subset of T lymphocytes, the thymosin or FCS-inducible T lymphocytes, who are



responsible for the suppression of IgE surface-bound B lymphocytes. Leucocytes also display below normal cyclic AMP responses on treatment with histamine, prostaglandin E, and isoproterenol, which are related to beta-adrenergic activity. Butler (1984) stated that while studies indicated that the leucocytes of atopic dermatitis sufferers have normal numbers of beta-receptors, other studies suggest they may show a reduced affinity for beta-agonists, or that the ratio of alpha receptors to beta-receptors is increased.

With regard to the relationship between cyclic AMP and those cells involved in the mediation of immune responses, in particular mast cells, basophils, and polymorphonuclear (PMN) leucocytes, the research provides further support for the beta-adrenergic blockade theory (Hanifin & Lobitz, 1977). In normal cells, when two or more IgE molecules on the surface of mast cells or basophils are bridged by an antibody to IgE or an antigen, there is a release of histamine and other inflammatory mediators. Beta-adrenergic agonists such as prostaglandin E and histamine act through adenyl cyclase to cause increased cyclic AMP production which leads to an inhibition of the inflammatory mediators. Reduced cyclic AMP functioning in atopic dermatitis means less inhibition of mediator release. While there was no difference between normals and atopic dermatitis sufferers with regard to the number of IgE molecules per basophil, the atopics tended to show a lower threshold of maximum histamine release by anti-IgE. Hanifin and Lobitz (1977) suggest that an imbalance caused by beta-adrenergic blockade could account for increased release of the inflammatory mediators from mast cells and basophils.

The beta-adrenergic blockade theory also explains the findings such as the increase in sweating due to injections of acetylcholine (Warndorff, 1970) and the lack of increased sweating following injection with propranolol, which acts as a beta-blocker (Hemels, 1970), as well as the responses to histamine injections described in the section on physiological deficits (Hanifin, 1982). Beta-adrenergic blockade would also explain the abnormal vascular reactions in atopic dermatitis, particularly the tendency towards vasoconstriction. This is because vasoconstriction is mediated by the alpha-adrenergic stimulation and a deficit in beta-adrenergic responsiveness due to blockade of receptors would lead to increased vasoconstriction (Guyton, 1991). Therefore, not only is there evidence of decreased cyclic AMP responses in atopic dermatitis but also many of the other immunological features of atopic dermatitis appear consistent with the beta-adrenergic blockade theory.

However, while there is much evidence to support Szentivanyi's theory, Ryan (1987) points to critics who suggest that beta-adrenergic blockade is due to therapy with sympathomimetic drugs such as steroid ointments. Infection is also believed to have a similar effect. Also, other theories have been put forward to explain the observed abnormalities (e.g., Butler, 1984; J. Ring, 1979). Butler, for instance,

stated that evidence from studies that indicated cyclic AMP responses to histamine and prostaglandin E<sub>1</sub> were also decreased. These findings could not be explained by the theory of blockade of beta-adrenergic receptors; this would require a defect in multiple receptors or a blockade of some common pathway involved in cyclic AMP production (Leung et al., 1987). Butler (1984) proposed that the fundamental defect may be elevated levels of cyclic AMP phosphodiesterase activity in leucocytes, a phenomenon already described by Grewe, Chan, & Hanifin (cited in Butler, 1984).

Therefore, evidence exists which supports Szentivanyi's (1968) beta-adrenergic blockade theory. In particular, reduced levels of cyclic AMP synthesis and increased alpha-adrenergic activity have been noted. The beta-adrenergic theory is appealing due to its ability to account for many of the observed abnormalities in atopic dermatitis. However, other theories have been put forward as explanations. The validity of these alternate theories has yet to be resolved.

#### *Allergic Factors*

It has been suspected by clinicians for many years before the discovery of reaginic IgE antibodies that atopic individuals appeared allergic to environmental stimuli such as inhalants, foods, and microorganisms. The review of immune system functioning of atopic dermatitis sufferers in the previous section, although indicating a number of abnormalities, seemed to cast doubt on a major role for IgE in the determination of the skin disorder. A number of researchers have investigated the role of allergies from a clinical perspective.

Rajka (1975), in his review of the clinical allergic studies, states that two major determining factors of results are whether the atopic patient has other atopic disorders and the age of the sufferers. Ninety percent of non-pure atopic dermatitis sufferers will react positively to a skin test while dietary allergens affect younger patients and inhalant allergens affect older patients.

Studies on incidence of positive immediate skin reactions vary from 52 to 97 percent. Provocation tests with pollens find less than 20 % respond positively, and this may reflect the later occurrence of hay fever. Similarly, animal hair affects 10 to 15 % of patients only. Human dandruff is still in debate as to its allergic status, and results from house-dust allergens is equivocal. Mould sensitivity affects 10 to 15 % of all pure cases (Rajka, 1975). More positive results have been recently found for the role of house-dust mite (e.g., H-I. Beck & Korsgaard, 1989). Positive reactions have been demonstrated for both skin application (Mitchell, Crow, Williams, and Platt-Mills, 1986) and skin-prick tests (Norris, Schofield, and Camp, 1988).

As noted above, reactivity to food decreases with age while inhalant allergy increases. Studies on large samples reviewed by Rajka (1975) revealed positive results in 29 to 75 % of cases, while Rajka's own studies found the incidence to be about 15 percent. He noted, furthermore, that positive reactions were often only

obtained when the skin was active. Milk and egg exclusion diets do not appear to have significant effects according to some studies (e.g., Neild, Marsden, Bailes, and Bland, 1986). However, the work of Sampson (Sampson & McCaskill, 1985; Sampson and Scanlon, 1989) suggests that exclusion diets may be beneficial. This debate continues (e.g., Atherton, 1988; R. Allen, 1988). (See Sampson, 1988, for a discussion of potential pathways of effect for food hypersensitivity in atopic dermatitis.)

Champion and Parish (1986) point out that for a food allergen to affect the skin, it must either penetrate the intestine and reach the skin or activate lymphoid cells or basophils which infiltrate the skin. A defect in IgA levels increases the likelihood of food allergies and, as described in the section on IgA above, there is some evidence of a transient deficit in infancy, which corresponds to the time of greatest impact of food allergies. Champion and Parish (1986) suggest that increased intestinal permeability may be the cause of the association with food allergy. A study conducted Bjarnason, Goolamali, Levi, and Peters (1985) found no evidence of increased permeability in adults while McCalla, Savilathi, Perkkio, Kuitunen, and Backman (1980) found supporting evidence in a study of children. Champion and Parish (1986) reviewed the evidence and concluded that the existing evidence does not clearly provide evidence of increased intestinal permeability in a significant proportion of cases.

In summary, the evidence regarding the importance of allergy in the pathogenesis of atopic dermatitis does not support a major role for this factor. It does, however, appear to be significant for the course of the disorder in a subgroup of the population, particularly those with other atopic disorders. However, this area is one where there are conflicting findings and further research is needed to clarify the role of allergic factors.

#### *Physiological deficits in atopic dermatitis: A summary*

The review of the literature in the preceeding sections has identified a number of important features of atopic dermatitis. In particular, a number of physiological and pharmacological abnormalities centring on the vascular system and the skin were found to exist in atopic dermatitis. At an immunological level, abnormalities in IgE mediated and cell-mediated immunity were described and at the cellular level, disturbances in cyclic nucleotide activity were reported. The beta-adrenergic blockade theory of Szentivanyi (1968) was outlined as a theoretical mechanism which could integrate these many features, and the evidence from genetic investigations suggested the importance of hereditary factors in transmission of the fundamental defect. As will be seen, psychological factors have also been put forward as playing a major role in the pathogenesis of atopic dermatitis. However, if psychological factors are to play a role, they must be consistent with these observed abnormalities. This point will be returned to after the psychological factors have been described.

### *Psychological factors*

The term "psychosomatic" was first introduced by Heinroth in 1818 (Whitlock, 1976) to describe a concept that had existed since ancient Greece (Rostenberg, 1959). The psyche and soma were not separate, discrete systems but were interactional in their relationship. The term was not used widely until the 1920s and 1930s when it was adopted by researchers such as Dunbar, Alexander and others to refer to those disorders in which emotional or psychological factors were thought to play a major, if not exclusive, role with regard to aetiology and maintenance. The classical psychosomatic disorders included asthma, essential hypertension, ulcerative colitis, rheumatoid arthritis, peptic ulcer, and neurodermatitis or atopic dermatitis (Whitlock, 1976). This conceptualisation was found to be unsatisfactory, and a more broadly defined concept that incorporates a biopsychosocial approach (G. Engel, 1977) has evolved (Lipowski, 1977). Lipowski stated that the principal aim of modern psychosomatic medicine is elucidating "the precise role of defined social and psychological factors in maintaining health and codetermining the development and course of disease" (1977, p. 234). The interaction of these variables was seen to be dynamic in the sense that "the relative contribution of these factors varies from disease to disease, from person to person, and from one episode of the disease in the same person to another episode" (Lipowski, 1977, p. 234). Lipowski identified several important influences on current conceptualisations of psychosomatic theory:

Current psychosomatic theory has been influenced by general systems theories, the doctrine of multicausality of somatic functions and behaviour, notions of psychophysiological response specificity and activation, the theory of operant conditioning and self-control of visceral functions, the hypothesis of object loss as an antecedent of disease, and by the concepts of psychosocial stress, cognitive appraisal and meaning, individual susceptibility to disease, adaptation, coping, and feedback (1977, p. 236).

If one adopts Lipowski's conceptualisation of psychosomatic medicine when examining the initiation, exacerbation, and maintenance of atopic dermatitis, social and psychological factors have a potentially important role to play. Several differing perspectives and approaches have been adopted to investigate the role of the social and psychological factors in a dynamic multifactorial view of atopic dermatitis.

### *Personality and atopic dermatitis*

The concept of the psychosomatic disorders as arising primarily as a result of psychological factors occurred at a time when the psychodynamic approach was gaining popularity. The postulation of unconscious emotional conflicts (e.g., Alexander, 1950), maternal rejection (e.g., Miller & Baruch, 1950), and specific personality profiles (e.g., Dunbar, 1943) as the source of atopic dermatitis grew directly out of the psychodynamic approach. As a consequence, a large body of research occurred in the 1940s, 50s, and 60s was directed towards identifying and describing the specific nature of the emotional conflict, maternal rejection, or personality profile associated with atopic dermatitis. This body of research will be reviewed in chapter 4.

This research failed in its goal for both methodological and theoretical reasons. Methodologically, it failed due to a lack of blind, appropriately controlled studies that employed valid and reliable assessment strategies. Theoretically, it failed because there was never consistency in the findings of the studies. More importantly, it failed because the researchers were unable to describe the pathways by which personality factors were thought to exert their influence on the skin (Whitlock, 1976). Even those that attempted to provide a model such as Alexander (1950) were unable to demonstrate that the specific personalities / unconscious conflicts developed the predicted disease or that individuals with the disease shared the predicted personality / conflict constellations. The studies also failed to show that physiological changes produced in the laboratory led to sustained pathophysiological states (Dorian & Taylor, 1987). Therefore, while the research on unconscious emotional conflicts, maternal rejection, and specific personality profiles constitutes the largest body of research on psychological aspects of atopic dermatitis, it has failed to provide consistent evidence. Despite this, research is still directed towards the examination of personality profiles of atopic dermatitis (e.g., Horne, White, & Varigos, 1988; Ullman, Moore, & Reidy, 1977) and maternal rejection (e.g., Koblenzer & Koblenzer, 1988).

### *Stress and atopic dermatitis*

The role of stress was implicit in the personality studies; a defective personality was thought to render the atopic dermatitis sufferer unable to handle stressors in a mature manner. In the 1950s and 60s, however, researchers also began to investigate the direct effect of stress on the psychosomatic disorders. Three main research strategies have been employed to investigate the relationship between stress and atopic dermatitis; retrospective interviews, life events, and daily hassles. These studies are reviewed in chapter 2.

The majority of studies (e.g., Cormia, 1951; Graham & Wolf, 1953; Whittkower & Edgell, 1951) employed retrospective interviews and these always found evidence of an association. The averaged results of these studies indicated a 70 % correlation between emotional stress and the onset and exacerbation of attacks. These studies, however, are subject to biasing effects due to the reliance on the subject's memory to recall events, their timing, their reaction, and the course of their skin symptoms (Whitlock, 1976).

Those studies employing life events measures (Gil, Keefe, McCaskill, Rodin, & Crisson, 1987; Wyler, Masuda, & Holmes, 1971) have failed to find evidence of a relationship between stressful life events and the onset or exacerbation of atopic dermatitis. However, the research utilising life events measures has been subject to considerable criticism. These criticisms have included challenging the major assumption of the approach; that is, that life change regardless of its nature has an additive effect of stress. It has been argued that in some cases a single major event may be a more important determinant (Brown, 1981), or that the absence of life events may be a stressor (Perkins, 1982). Others have argued that only undesirable events were important (e.g., Mueller, Edwards, & Yarvis, 1978; Vinokur & Seltzer, 1975), or that uncontrollable events were better predictors of illness (Stern, McCants, & Pettine, 1982).

Briefly, other criticisms have included the possibility that the reliance on retrospective recall could lead to biasing effects (G. Brown, Sklair, Harris, & Birley, 1973; Wershow & Reinhart, 1974); and the fact that many items on life events measures could be symptoms or the consequence of illness (Dohrenwend, Dohrenwend, Dodson, & Shrout, 1984; Hudgens, 1974). The published studies have been criticised as obtaining significant results only because the large sample sizes employed mean small correlations are significant; the variance accounted for rarely exceeding ten percent (Rabkin & Struening, 1976). Finally, the large variances obtained, often three to four times greater than the mean, indicate a random distribution and a lack of central tendency (Wershow & Reinhart, 1974), while test-retest reliability in reported studies has varied considerably (Rabkin & Struening, 1976). These criticisms will be discussed in more depth in chapter 2 (for reviews, see Andrews & Tennant, 1978; G. Brown, 1981; Creed, 1985; Hudgens, 1974; Paykel, 1983; Perkins, 1982; Rabkin & Struening, 1976; Wershow & Reinhart, 1974). Therefore, the results of the life events studies must be treated with caution.

One study has investigated the relationship between daily hassles and exacerbations of atopic dermatitis in children (Gil et al., 1987). This study failed to find evidence of a relationship. However, as with life events measures, the reliance on retrospective recall of hassles over the previous six months in the study raises the issue of bias in recall. Furthermore, the checklist employed was modified from one

derived for use with college students and no reliability or validity data was reported for the modifications. Therefore, the implications of the findings of Gil et al.'s (1987) study are unclear. This study will be discussed in more detail in chapter 2.

In summary, the research on the relationship between stress and atopic dermatitis is divided into two. Those studies employing retrospective interviews find emotional stress to precede the onset and exacerbations of skin symptoms in approximately 70 % of cases. However, those studies utilising other forms of assessment of stress such as life events and daily hassles have failed to find evidence of such a relationship. Furthermore, the approaches adopted in the past have been limited by the methodological shortcomings described above. Obviously, this is an area where further research is required to both clarify these inconsistent results and overcome methodological limitations in previous studies.

#### *Emotional disturbance and atopic dermatitis*

Closely linked to both the personality research and the stress research are studies that have investigated the presence of emotional disturbance in sufferers of atopic dermatitis. Personality researchers often failed to distinguish between personality traits and states of emotional distress such as anxiety and depression (Whitlock, 1976). A number of studies found evidence that atopic dermatitis sufferers were more anxious (e.g., Faulstich, Williamson, Duchmann, Conerly, & Brantley, 1985; Garrie, Garrie, & Mote, 1974; Jordan & Whitlock, 1972) and more depressed (e.g., Al-Ahmar & Kurban, 1976; Endicott, 1965) than normal controls. However, Whitlock (1976) has suggested this may be a natural consequence of the disorder, a point supported by the study of Jowett and Ryan (1985) who found many eczema sufferers felt depressed and anxious about their condition. Studies have also suggested that atopic dermatitis sufferers are more anxious (Al-Ahmar & Kurban, 1976; Endicott, 1965; Garrie et al., 1974) and more depressed (Al-Ahmar & Kurban, 1976; Endicott, 1965) than dermatological controls. Such a finding suggests that anxiety and depression may not merely be a consequence of having a skin disorder. These studies will be reviewed in chapter 4.

A second line of evidence that supports the role of emotional distress in atopic dermatitis is the studies that have shown the impact of therapeutic interventions designed to reduce levels of stress or emotional difficulties on the course of symptoms. Relaxation therapy with biofeedback (Gray & Lawlis, 1982; Haynes, Wilson, Jaffe, and Britton, 1979, McMenamy, Katz, and Gipson, 1988), in combination with cognitive and behavioural interventions (Cole, Roth, & Sachs, 1988; Horne et al., 1989, Ratliff & Stein, 1968), or hypnosis (Brown & Bettley, 1971) has led to significant improvements in many patients studied. Brief psychodynamic psychotherapy has also led to significant reductions in symptoms for a proportion of patients which have been maintained at follow-up (Brown & Bettley,

1971; Cormia, 1951; Schoenberg & Carr, 1963), though this has not always been demonstrated (Seitz, 1953). Therefore, the evidence regarding the relationship between emotional distress in the form of anxiety or depression and atopic dermatitis is more consistent. So too is the evidence of the benefits on sufferers' skin symptoms of therapeutic interventions designed to reduce stress or alleviate emotional difficulties.

*Psychophysiological factors and atopic dermatitis*

Early researchers have postulated that the autonomic nervous system plays a role in determining the symptomatology of atopic dermatitis. Urbach and Gottlieb (cited in Beerman, 1962) proposed that emotional factors may cause alterations in the arousal of the autonomic nervous system, that upon reaching a threshold level, produce the dermatological changes. They also suggested that emotional factors may influence the vascular innervation producing changes in blood supply to the skin. This was thought to allow pathological substances to set off antigen-antibody reactions. Thirdly, they proposed that psychological factors may act in a similar fashion to a conditioned reflex. Rothman and Walker (cited in Beerman, 1962) felt emotional factors led to a lowering of the itch threshold. More recently, Faulstich et al. (1985) suggested an increase in sympathetic arousal of the autonomic nervous system may play a role.

A number of psychophysiological studies support the role of emotional factors in affecting the symptoms of atopic dermatitis through mechanisms under the influence of the autonomic nervous system such as increased vasodilatation and itch (Graham & Wolf, 1953), vascular reactions to histamine injections (Kalz, Wittkower, Vavruska, Telner, & Ferguson, 1957), and greater EMG and heart rate activity (Faulstich et al., 1985). Kepecs, Robin, & Brunner (1951) also demonstrated that emotional factors could affect exudation rates into the skin. Other psychophysiological studies on such variables as blood pressure, heart rate, and skin temperature have provided mixed results. However, there is some evidence to suggest sympathetic dominance of the autonomic nervous system. This is reflected by lower resting skin temperature (Abrams & Farber, 1963; Johnson & Winkelmann, 1965) and digital blood flow (Abrams & Farber, 1963), greater reactivity in skin temperature changes to cooling (Eyster, Roth, & Kierland, 1952; Johnson & Winkelmann, 1965), greater reactivity in blood pressure (Eyster et al., 1952) and heart rate (Wenger, Clemens, and Cullen, 1962) changes to the cold pressor, as well as slowness of recovery in heart rate, electromyograph (Faulstich et al., 1985), and skin temperature (Eyster et al., 1952).

Not all evidence supports this hypothesis, though. For example, in Faulstich et al.'s (1985) study, atopic dermatitis sufferers were compared to normal controls on four psychophysiological stressors; IQ-type questions, self-directed imagery of an



anxiety-provoking incident, the cold pressor, and relaxation. The psychophysiological variables of heart rate, EMG, peripheral vasomotor response, skin temperature, and skin resistance were recorded. The atopic dermatitis sufferers showed higher muscle tension during and after the cold pressor and slower recovery of heart rate after the cold pressor. They did not differ significantly from the control subjects during or after any of the other stressors, nor in the baseline periods before each stressor. The more pronounced vasoconstriction observed in normal room temperature (e.g., Abrams & Farber, 1963; Johnson & Winkelmann, 1965) was not reflected in the baseline peripheral vasomotor response or skin temperature data. Furthermore, these variables did not display greater reactivity or slower recovery to the stressors. This is important as a theory of a role for sympathetic dominance in atopic dermatitis would appear most relevant if the sympathetic dominance is reflected in skin and peripheral vascular system variables such as blood flow, skin temperature, and skin conductance. Such a finding would be consistent with the observed psychophysiological phenomenon of symptom specificity; the tendency of individuals with specific physiological disorders to respond maximally to stimuli in the same physiological system (Malmo & Shagass, 1949). This point will be returned to later. Psychophysiological studies of atopic dermatitis will be reviewed in chapter 6.

The studies investigating physiological functioning in atopic dermatitis reported earlier in the chapter demonstrated that a number of abnormalities existed with regard to the peripheral vascular system. The psychophysiological studies have not only collaborated these findings but have also demonstrated that emotional factors may influence the functioning of the peripheral vascular system in atopic dermatitis sufferers (e.g., Graham & Wolf, 1953). In doing so, these studies have suggested a direct path by which psychological factors may exert an influence on skin symptoms.

#### *Learning theory and atopic dermatitis*

Learning theory has provided an alternative approach to consideration of the role of psychological factors in atopic dermatitis. Some researchers (e.g., Bar & Kuypers, 1973; Jordan & Whitlock, 1972) have suggested that scratching behaviour may be understood through operant principles. Under this conceptualisation, scratching is positively reinforced by the reduction of itch and the accompanying tension. This positive outcome rewards scratching behaviour and contributes to the development of the "itch-scratch cycle".

Support for this theory comes from two sources. First, Jordan and Whitlock (1972) demonstrated that atopic dermatitis sufferers displayed more conditioned scratch responses to an itch stimulus and a greater number of trials to habituate to a conditioned stimulus than a medical control group. The number of trials needed to habituate to the itch and the number of conditioned scratch response during the extinction phase were not significantly different from the controls but were in the

predicted direction. Later research (Jordan & Whitlock, 1974) indicated a mediating role of anxiety level in these results.

The second line of evidence for the operant model of scratching comes from group and single-case studies of the application of aversive therapy (Ratcliff & Stein, 1968), and habit reversal or response substitution (Cataldo, Varni, Russo, Estes, 1980; Cole et al., 1988; Horne et al., 1989; Melin, Frederiksen, Noren, & Swebilius, 1986; Rosenbaum & Ayllon, 1981; D. L. Watson, Tharp, Krisberg, 1972). These studies reported significant and continued improvement as a result of the behaviour therapy interventions.

More recently, Gil and her associates (Gil et al., 1988) have examined scratching behaviour within a social learning context. According to this perspective, social responses to scratching and other environmental factors such as type of activity may determine scratching behaviour. As a test of this, Gil et al. (1988) examined the scratching behaviour of children during interactions with a parent while engaged in a structured and unstructured task. Results indicated that children scratched more during unstructured activities and that parental responses such as attention and physical contact to the child's scratching may serve to reinforce this behaviour. This is consistent with those studies that have found that elimination of social reinforcement of scratching behaviour has led to improvements in the skin condition of subjects (K. Allen & Harris, 1966; Bar & Kuypers, 1973; E. Carr & McDowell, 1980; Dobes, 1977; Latimer, 1979a; Walton, 1960; D. L. Watson et. al, 1972). In summary, the literature on atopic dermatitis from a learning theory perspective has provided consistent results on the potential influence conditioning and social reinforcement may play in atopic dermatitis. The numerous single-case and group studies, as well as the work by Gil et al. (1988) and Jordan and Whitlock (1972; 1974), have particularly highlighted the effect of these factors on the maintenance of the lesions through influencing scratching behaviour.

#### *The pathogenesis of atopic dermatitis: An integration of factors*

The above review of atopic dermatitis suggests that it is a disorder with multifactorial determinants; biological, environmental, psychological, and social factors interplay in the course of the disorder. From a biological perspective, a genetic basis appears to underly the fundamental defect in approximately 70 % of cases. Physiological abnormalities have been shown to exist primarily in the peripheral vascular system with increased vasoconstriction in unaffected skin, increased blood flow in acutely affected skin and the white dermographism due to vasoconstriction observed upon stroking affected skin. Pharmacological abnormalities also lead to effects in the skin; the delayed blanch phenomenon due to vasodilatation upon injection of acetylcholine and abnormal reactions to histamine and nicotinic acid being the most notable. Evidence from immunological studies also indicates abnormalities in

the form of increased IgE levels, depression of T-cell function, decreased numbers of circulating rosette forming T-cells, mature T lymphocytes and natural killer cells and increased numbers of B lymphocytes with surface bound IgE. Studies of cyclic nucleotide activity pointed to evidence of decreased cyclic AMP responses. From the available evidence, allergic factors appear to play a minor role in the pathogenesis of the disorder.

Although Szentivanyi's (1968) beta-adrenergic blockade theory is not without its critics, it has the capacity to explain and integrate many of the observed abnormalities. As previously noted, beta-adrenergic blockade would lead to a reduction in the synthesis of cyclic AMP and evidence from studies reviewed supports the occurrence of this in atopic dermatitis. From an immunological point of view, this decreased cyclic AMP activity would lead to decreased T-lymphocyte maturation and function as well as an increase in IgE surface bound B-lymphocytes. These features are found in atopic dermatitis sufferers. From a pharmacological point of view, the observations regarding the responses of atopic dermatitis sufferers to injections of acetylcholine, propranolol, and histamine are consistent with the beta-adrenergic blockade hypothesis. Furthermore, Hanifin (1982) points out that the findings regarding increased skin levels of histamine and the lower threshold of histamine release from atopic basophils, mast cells, and leucocytes are consistent with the beta-blockade theory of defective control processes in these cells.

From a psychological perspective, potential contributions to the pathogenesis of atopic dermatitis are considerable. The research regarding stress and atopic dermatitis which has relied on retrospective interviews has found evidence of a relationship while studies utilising life events and daily hassles have failed to find evidence of a relationship. Therefore, uncertainty remains regarding the role of stress. However, as will be seen in chapter 2, there is now accumulating considerable evidence regarding the impact of stress on immune system functioning and cyclic nucleotide processes (for reviews see Baker, 1987; Daruna & Morgan, 1990; Dorian & Garfinkel, 1987; Jemmott & Locke, 1984). In fact, the effect of stress is often consistent with the observed abnormalities in atopic dermatitis and the beta-adrenergic blockade theory. Therefore, mechanisms would appear to exist by which stress may play a role in the exacerbation and maintenance of atopic dermatitis symptoms. Given this, the issue of stress in atopic dermatitis deserves further research to clarify what role it does play in determining skin symptoms. This point will be returned to in chapter 2.

Closely related to stress is emotional distress, which has been proposed as a factor in determining the course of atopic dermatitis. There are several lines of evidence to support this. First, a number of studies have found atopic dermatitis sufferers to be more anxious or depressed than normals (e.g., Al-Ahmar & Kurban, 1976; Faulstich et al., 1985). However, Whitlock (1976) has suggested this may be a

natural consequence of the disorder, a point supported by the study of Jowett and Ryan (1985) who found many eczema sufferers felt depressed and anxious about their condition. Of more weight are the studies reviewed that demonstrate that interventions to alleviate the distress are often associated with improvements in the skin condition. The third line of evidence comes from those studies reviewed (in the section under associated disorders) that suggest that there is an association between atopic dermatitis and affective disorders (A. Allen, 1989; Garvey & Tollefson, 1988; Nasr et al., 1981; Preston, 1969). Finally, there is the research that suggests that, like stress, depression may affect immune system functioning (Dorian & Garfinkel, 1987). These studies from diverse areas provide a strong argument for the role of emotional factors in the course of atopic dermatitis.

Unconscious conflicts, maternal rejection, and specific personality types have all been posited as having an aetiological role. As indicated previously, the evidence regarding these factors is inconsistent and much is methodologically flawed. However, while now considered by most researchers to be of little importance in the aetiology of the disorder, there are still some workers (e.g., Koblenzer, 1987, 1988) who believe personality factors to play a role.

Psychophysiological studies of atopic dermatitis constitute the fourth area of psychological factors reviewed. These studies have indicated that emotional factors could influence such areas as vasodilatation and itch (D. T. Graham & Wolf, 1953), exudation rates into the skin (Kepecs, Robin, & Brunner, 1951) and reactions to histamine injections (Kalz et al., 1957). Obviously, these are all relevant to the symptomatology of atopic dermatitis. Other psychophysiological studies on such variables as blood pressure, heart rate, and skin temperature have provided mixed results. However, there is some evidence to suggest sympathetic dominance of the autonomic nervous system. This is reflected by lower resting skin temperature and digital blood flow, greater reactivity in skin temperature changes to cooling, greater reactivity in blood pressure and heart rate changes to the cold pressor, as well as slowness of recovery in heart rate, skin temperature, and electromyograph (e.g., Abrams & Farber, 1963; Faulstich et al., 1985; Johnson & Winkelmann, 1965). However, as was described in the section on psychophysiological studies, the studies are not always consistent. Those observations which find evidence for sympathetic dominance, in particular those related to blood flow and skin temperature, are consistent with the physiological studies regarding increased peripheral vasoconstriction. Peripheral vasoconstriction is an alpha-adrenergically controlled mechanism and thus falls under the control of the sympathetic system (Larsen, Schneiderman, & Pasin, 1986).

If one attempts to reconcile the evidence for sympathetic dominance in atopic dermatitis sufferers with the beta-adrenergic blockade theory, difficulties would appear to arise. The two theories are compatible with regard to findings on mechanisms involving primarily alpha-adrenergic receptors such as vasoconstriction in the skin and arterial blood pressure (Larsen et al., 1986). However, they appear to contradict each other with regard to studies suggesting increased heart rate reactivity or slowness of recovery of heart rate, a beta-adrenergically dominated response (Larsen et al., 1986; Guyton, 1991). A source of reconciliation may be to state that the beta-adrenergic blockade is partial. In fact, partial beta-blockade is what Szentivanyi (1968) has proposed.

The findings from studies on learning theory applications to atopic dermatitis indicate that conditioned scratch responses may occur in response to itch stimuli (Jordan & Whitlock, 1972). Given the finding of the psychophysiological study by D.T. Graham and Wolf (1953) that itch thresholds could be lowered by emotional factors, the possibility of an itch-scratch cycle being initiated by emotional stress appears likely. This is supported by those studies that demonstrate the benefits on skin symptoms of interventions based on learning theory which target scratching behaviour (e.g., Cataldo et al., 1980; Horne et al., 1989; Melin et al., 1986). Demonstration of the fact that social factors may influence scratching behaviour and consequently skin lesions (e.g., Gil et al., 1988; Dobes, 1977; Latimer, 1979a) add further weight to the role of learning factors in atopic dermatitis. The findings from studies on scratching provide a mechanism for the exacerbation of the skin lesions which is additional to research regarding physiological, pharmacological, and immunological changes affecting processes within the skin such as pruritus.

The integration indicates that biological, psychological, and social factors interplay in the course of the disorder. Therefore, there is a need for explanatory models of atopic dermatitis to integrate these factors. In other words, atopic dermatitis must be viewed from the biopsychosocial approach that Lipowski (1977) advocates for modern psychosomatic medicine. While earlier authors have presented integrations of the psychological aspects of atopic dermatitis (e.g., Fritz, 1979; Kuypers, 1968), recent authors have attempted to provide integrated psychobiological approaches to the understanding of atopic dermatitis.

#### *Recent psychobiological perspectives on atopic dermatitis*

Whitlock (1976) in his classic work *Psychophysiological Aspects of Skin Disease* advocated a multifactorial perspective. He concluded that "in all probability psychological influences are but one factor in the total aetiological complex" (Whitlock, 1976, p.130). At the basis of this disorder, he saw a genetically inherited itchy skin. His review of the literature was critical of many of the studies that purported to show personality differences between atopic dermatitis sufferers and

normal controls. In particular, he repeatedly stated the need to consider the impact of a lifelong affliction of atopic dermatitis on the personality development of an individual, as well as the emotional impact of exacerbations. However, he felt that an individual's personality may lead to them being more susceptible to stress which exacerbates the skin symptoms through psychophysiological processes. Whitlock (1976) acknowledged the findings of Garrie et al. (1974) who found atopic dermatitis sufferers reported higher state and trait anxiety than both normal and dermatological controls. He concluded that the raised anxiety was initially the result of the disorder rather than a cause. However, over time a vicious cycle is created whereby anxiety provoked itching and itching and scratching led to increases in anxiety.

With regard to psychophysiological functioning, he concluded that "emotional changes bring about alterations in the abnormal pharmacological state of the skin by influencing the allergic response, by reducing itch thresholds through vasodilatation and sweating, or conceivably by initiating some central process leading to spontaneous itching in vulnerable areas of skin" (Whitlock, 1976, p. 144). He provided psychophysiological evidence in support of these speculations. Rovensky and Saxl (cited in Whitlock, 1976) found that emotional stimuli increased sweating in affected skin and that sweating was directly related to increased itching. Cormia (cited in Whitlock, 1976) had found that in cases of lichen simplex, the itch threshold was lowered by vasodilatation and varied according to the mental state of the person. Ely, Verkey and Holmes (cited in Whitlock, 1976) found that mental stress and experimentally induced stress lowered itch threshold to intraepidermal injection of trypsin in normals. With regard to atopic dermatitis, Whitlock cites D.T. Graham and Wolf's (1953) work which showed that discussion of emotionally disturbing topics would lead to increased itching and scratching. Whitlock speculated that this lowering of itch threshold was mediated by the release of histamine and proteinases in the skin in response to the emotional arousal rather than a direct vasodilatory effect by sympathetic innervation.

His own work on conditioning of scratching behaviour (Jordan & Whitlock, 1972; 1974) provided a further means for understanding the interplay between psychological and physiological factors in the disorder. Whitlock himself felt that once established conditioned scratch responses may be elicited by emotionally arousing stimuli. Therefore, Whitlock's approach emphasised that atopic dermatitis was a multifactorial disorder that most likely involved a genetically-determined itchy skin that psychological factors such as the stress of emotional distress could affect through psychophysiological means. His own work on conditioning of scratching behaviour suggested that emotional states, as well as other factors such as sweating, vascular dilatation, and possibly allergic responses, could trigger scratching of the itchy skin.

Faulstich and Williamson (1985) stated that the pathophysiological and psychological factors in atopic dermatitis did not appear mutually exclusive; instead they saw an interaction of the factors as the most likely explanation for the disorder. For example, stress and anxiety may lead to conditioned scratching of lesions that have developed as a consequence of pathophysiological factors such as allergic reactions. They also drew on their own research and that of Garrie et al. (1974) which indicated that anxiety levels were elevated in atopic dermatitis sufferers. As many of the physiological features of anxiety (e.g., increased heart rate, sweating, pallor of the skin) are sympathetically mediated, this was consistent with their findings of increased sympathetic arousal to experimentally induced stress (Faulstich et al., 1985). They concluded that stress, anxiety and other psychological factors may lead to the pathophysiological mechanisms, possibly through sympathetic arousal. Therefore, they considered stress and emotional reactions such as anxiety to play a potentially important role in atopic dermatitis. Faulstich and Williamson (1985) are critical of the personality research and believe that any traits associated with the disorder are a result rather than a cause of the condition. They regarded current medical treatments as palliative and advocated further investigation of psychological interventions. In particular, they point to those studies that have demonstrated the benefits of modification of scratching behaviour.

Koblenzer (1987, 1988, Koblenzer & Koblenzer, 1988) presents another unified psychobiological approach to atopic dermatitis. She saw stress as an important initial factor that influenced atopic dermatitis symptoms in individuals with a genetic vulnerability. She pointed to the evidence from psychoneuroimmunology and psychoneuroendocrinology (to be reviewed in chapter 2) which indicates pathways exist by which stress may directly influence immunological and endocrine functioning. In this way, she was able to link the literature regarding psychological and physiological and immunological factors discussed earlier in this chapter. She saw stress as creating lower levels of itch threshold through these physiological mechanisms. Furthermore, she drew on Faulstich et al.'s (1985) finding of increased sympathetic arousal in atopic dermatitis sufferers to suggest a link between stress and Sventivanyi's (1968) beta-blockade theory. Such sympathetic tone would result in greater increases in alpha-adrenergic and cholinergic activity. This greater activity would lead to greater histamine release and, consequently, the development of pruritus.

Koblenzer (1987, 1988) placed great importance on personality and psychodynamic factors in atopic dermatitis, although she reported no consistent psychological pattern existed in her patients. However, she said that there appeared to be a greater association between atopic dermatitis and obsessive-compulsive neurosis than with hysterical neurosis, and a decreased association with personality disorders

or psychosis. Suppression of aggression was also a common finding in her patients as a consequence of a disturbed mother-child relationship but this feature was not unique to atopic dermatitis. She felt that "the pathophysiological effects of stress in patients with skin disease are largely determined by the personality configuration of the individual and the level, if any, of psychopathology" (Koblenzer, 1988, p. 29).

As a psychodynamic therapist, she stressed the importance of childhood in the development of personality structure. In her view, children who have not received appropriate levels of tactile stimulation in infancy may regress to an infantile level of development in response to stress, with skin symptoms developing as a consequence. In atopic dermatitis, she regarded the mother-child relationship as being of key importance. Following the work of Spitz (1951) and others reviewed in Chapter 4, she viewed the mothers of atopic children as superficially anxious regarding the health and care of their infants. However, this anxiety was a defence against unconscious hostility that the mother was at times apt to reveal, sending the child confusing and inconsistent emotional messages. Koblenzer felt that often this maternal ambivalence was reflected in a lack of strict controls on the child. The consequences of this disturbed mother-child relationship was the development of anxiety in the child, suppression of aggression, and the eroticism being centred in the skin (Koblenzer, 1987).

Scratching was seen as weapon with which to manipulate the parents as guilt leads to an intolerance of scratching on the part of the mother (Koblenzer, 1988). However, she acknowledged that despite this dynamic formulation of the scratching behaviour, the response could become a conditioned response, as demonstrated by the studies of Jordan and Whitlock (1972, 1974). The tendency towards lower itch thresholds as a result of histamine release and cutaneous vascular reactions was also thought to contribute substantially to the development of scratching behaviour.

#### *An evaluation of the psychobiological perspectives*

There is much common ground between the three perspectives outlined. All acknowledge the evidence that indicates a genetic basis for the disorder, and that the disorder is most likely multifactorial in aetiology, with immunological and physiological abnormalities of aetiological importance. From a psychological perspective, all three perceive a role for stress in altering physiological functioning in such a way as to contribute to exacerbations. However, as was discussed in the relevant section above, the evidence regarding the role of stress in the course of the disorder is inconsistent. Those retrospective interview studies that support the role of stress are methodologically flawed, while life events and daily hassles studies do not find evidence of a relationship. The relationship between stress and atopic dermatitis has yet to be adequately demonstrated. Consequently, this area that requires further research so that its place within the psychobiological formulations can be clarified.



With regard to the potential pathways by which stress may affect skin symptoms, Whitlock (1976) tends to focus on psychophysiological mechanisms, as little was then known about the psychoneuroimmunological and psychoneuroendocrinological pathways emphasised by Koblenzer (1987, 1988). However, both he and Koblenzer do see an important potential role for emotional factors in the release of histamine and other itch-producing substances. Faulstich and Williamson (1985) felt that stress influenced exacerbations through increased sympathetic arousal but did not outline specific mechanisms. Koblenzer (1987) also acknowledged Faulstich et al.'s (1985) findings on sympathetic tone as a potential pathway for the effect of stress on skin symptoms. However, as was discussed in the section on psychophysiological studies above, this study provided only partial support for the idea of increased sympathetic tone. This support was limited to one task; the cold pressor; and to the variables of heart rate and EMG, but was not reflected in the logically more relevant measures of peripheral vasomotor tone and skin temperature. While evidence from other studies does support increased sympathetic tone of the peripheral vascular system (e.g., Abrams & Farber, 1963; Eyster et al., 1952; Johnson & Winkelmann, 1965), results have been inconsistent and limited to observations on the effects of the cold pressor and changes in room temperature. Therefore, there needs to be a demonstration of more evidence in favour of increased sympathetic tone in response variables relevant to the symptoms of the disorder. Such a demonstration would be consistent with the established psychophysiological concept of symptom specificity. If such evidence can be found, it would justify the inclusion of sympathetic tone as a potential pathway for the effects of stress.

All three perspectives appear to agree on the importance of conditioning of scratch responses and the role of scratching in maintaining the skin symptoms. The evidence that conditioning may occur to itch responses (Jordan & Whitlock, 1972) supports the inclusion of this factor. So too does the literature indicating that behaviour therapy interventions aimed at modifying scratching leads to improvements in skin symptoms (e.g., Cataldo et al., 1980; Cole et al., 1988; Home et al., 1989). Studies by Gil et al. (1988), Bar and Kuypers (1973), Dobes (1977) and others indicate that social factors may also influence scratching behaviour in sufferers. Therefore, the inclusion of conditioned scratch responses as a determining factor in the course of atopic dermatitis appears justified on the basis of the evidence.

With regard to maternal rejection, the perspectives vary. Whitlock (1976) appeared to give this factor minor importance; tending to view it as just a potential stressor. Rejection may occur as a consequence of the child's appearance and the resulting emotional stress would aggravate an existing dermatitis. Koblenzer's work has stemmed from that of Miller and Barush (1948, 1950) and Spitz (1951) on maternal rejection. She placed great importance on the role of maternal rejection in

atopic dermatitis, seeing the child's defence reactions and suppression of aggression as leading to the somatic expression of the rejection. Scratching was then seen as masochistic self-excoriation or a tool to manipulate the parents. However, she has not addressed criticisms of the work of early psychodynamic theorists by authors such as Whitlock (1976) or the experimental evidence which does not support the maternal rejection theory (C. Solomon & Gagnon, 1987).

More recently, A. Allen (1989) has disagreed with Koblenzer's view of the mother as ambivalent and hostile. He felt that the poor parenting on the part of the mother was a secondary effect of the presence of major affective disorder, citing the association between affective disorder and atopic dermatitis. He suggested that although counselling may help people cope with major affective disorders, it was not an adequate treatment of the underlying disorder. He indicated that the standard treatment for affective disorder included the use of anti-depressant medication and this treatment approach should be adopted with the mothers of the atopic children. Koblenzer (Koblenzer & Koblenzer, 1989) defended her position, stating that none of the seven mothers of children referred to in her article (Koblenzer & Koblenzer, 1988) suffered from major affective disorder. Furthermore, she advocated the use of psychodynamic therapy for the mother over the use of antidepressant medication as a means of improving maternal care of the child.

With regard to the role of personality, Whitlock (1976) states that it is possible that some constellation of personality traits may make one more vulnerable to emotional arousal and hence the physiological effects of such arousal. However, his review of the evidence concluded that "personality traits- if any- specific to atopic patients are the consequences rather than the causes of the disease" (Whitlock, 1976, p. 148). Faulstich and Williamson (1985) are also critical of the personality research and agree that any traits associated with the disorder are a result rather than a cause of the condition. Koblenzer (1987) reported that she saw no consistent psychological pattern but noted a greater association between atopic dermatitis and obsessive-compulsive neurosis than with hysterical neurosis. Suppression of aggression was also a common finding in her patients as a consequence of the disturbed mother-child relationship but this feature was not unique to atopic dermatitis. Despite this inconsistency with regard to the personality configuration, Koblenzer (1988) felt that it may play a major role in determining the pathophysiological effects of stress, as individuals with less mature personalities would have more ineffective defence strategies. Therefore, she placed a more important emphasis on personality as a factor in atopic dermatitis symptoms than Whitlock or Faulstich and Williamson.

The accumulated evidence on personality and atopic dermatitis reviewed in chapter 4 has produced inconsistent results. No personality specific to atopic dermatitis sufferers has been adequately demonstrated. Furthermore, most studies have been methodologically flawed, affecting their interpretation. However, research continues to be conducted on this topic (e.g., Horne et al., 1988). The interrelationships between various personality variables and emotional factors such as anxiety have received little attention but may be of importance (see Jordan & Whitlock, 1972, 1974).

The final area considered by the three perspectives is that of the role of emotional distress such as anxiety. All authors acknowledge the evidence suggesting that atopic dermatitis sufferers are more anxious than normals or dermatological controls (e.g., Al-Ahmar & Kurban, 1976; Garrie et al., 1974). Also, the authors see anxiety as playing a mediating role in skin symptoms through its association with scratching behaviour (Jordan & Whitlock, 1972, 1974). Adopting a bidirectional view, Whitlock suggested that the itch and scratching may conversely lead to increases in anxiety. Faulstich and Williamson (1985) also saw it as a potentially triggering pathological changes in the peripheral vascular reactions that lower itch threshold, possibly through the increased sympathetic arousal suggested by their research. Koblenzer (1987) concurred with this view. However, this mechanism has not been demonstrated experimentally. Furthermore, two pieces of evidence argue against this hypothesis. First, Ackner's (1956) review of the effects of emotional factors on the peripheral vasomotor system suggested anxiety led to vasoconstriction. Also, D.T. Graham, Goodell, and Wolff (1957) found that vasodilatation was associated with decreases in itch threshold rather than vasoconstriction. Second, D.T. Graham and Wolf (1953) found that frustration, rather than anxiety led to a lowering of the itch threshold in their subjects. With regard to depression, both Whitlock (1976) and Koblenzer (1987) acknowledge the increased association between depression and atopic dermatitis but neither appears to consider that it may play a role in pathogenesis. On the contrary, Whitlock feels that depression is a natural consequence of the affliction.

As indicated above, the interrelationships between personality variables and emotional factors in atopic dermatitis have received little attention but research suggests that certain factors are interrelated. Therefore, a study of personality factors in atopic dermatitis should include an examination of the relationship of emotional factors as well.

In summary, the three psychobiological perspectives have much in common in their conceptualisations of atopic dermatitis. All attempt to integrate the psychological literature into the biological research findings but with differing emphases and sophistication. Stress is acknowledged by all authors as an important factor in the

course of the disorder, though they vary in their speculations regarding the pathways by which it affects skin symptoms. However, empirical support regarding the role of stress on the course of atopic dermatitis and its influence on psychophysiological processes is limited. The perspectives also differ in their perceptions of the role of personality factors and maternal rejection in the course of the disorder. The empirical evidence, although flawed methodologically, argues against a specific personality profile or a major aetiological role for personality. However, this does not preclude the possibility that an individual's personality renders them more susceptible to the effects of stress. The role of conditioning of scratch responses is accepted by all authors and its importance is well supported by the literature. Emotional states such as anxiety and depression are acknowledged as occurring in atopic dermatitis but disagreement exists as to whether this is a consequence or cause of the condition.

The three conceptualisations of atopic dermatitis fulfill many of the demands of the biopsychosocial approach to psychosomatic medicine advocated by Lipowski (1977). They all emphasise the importance of multicausality of somatic functions and individual susceptibility to illness. The influence of factors such as operant conditioning, psychosocial stress and psychophysiological response specificity are heavily emphasised in the conceptualisations. With the exception of the role of operant conditioning, however, the evidence supporting the influence of these factors is both limited and inconsistent. Clearly, more research needs to be directed to these areas.

Furthermore, the conceptualisations fail to incorporate all the factors emphasised by Lipowski. Little is mentioned of social influences on the course of the skin disorder although the work by Gil et al. (1988) and others (e.g., Bar & Kuypers, 1973; E. Carr & McDowell, 1980; Dobes, 1977) demonstrate that social factors can affect scratching behaviour and the extent of the lesions. The conceptualisations of psychosocial stress do not consider the important role of appraisal, meaning and coping in stress (Folkman & Lazarus, 1980; Lazarus & Folkman, 1984). This is an area that has been investigated in psychosomatic disorders (e.g., Billings & Moos, 1981; Vingerhoets & Menges, 1989; Vingerhoets & Van Heck, 1990) but not specifically atopic dermatitis. (Koblenzer, 1987, does mention the work of D. Brown, 1972, who emphasised that it was the meaning of the event, rather than the event per se, which determined whether it was stressful or not. However, this issue is not pursued by her in any more depth.) Finally, the area of self-control of visceral functions through biofeedback is not addressed, though some studies have examined this possibility in atopic dermatitis (Gray & Lawlis, 1982; Haynes et al., 1979; McMenamy et al., 1988).

#### *The current research*

The overall purpose of this thesis is to investigate key issues related to the psychological aspects of the three psychobiological conceptualisations of atopic

dermatitis presented above. More specifically, it will examine those aspects identified by the approaches as being of importance but for which empirical support is lacking, inadequate or flawed. In doing so, it will be possible to assess the adequacy of the conceptualisations as they currently stand as well as highlighting areas requiring revision or further research. A further aim of this research is to examine a key influence on modern conceptualisations of psychosomatic theory identified by Lipowski (1977) but not addressed by the psychobiological conceptualisations of atopic dermatitis. This is the role of cognitive appraisal and coping processes in the disorder. Another influence identified by Lipowski is self-control of visceral functions. This also has not been incorporated into the current conceptualisations. However, it will not be addressed in this thesis due to limits in time but will be discussed in relation to other areas in the final chapter. The areas of investigation will now be discussed in more detail.

A central contention of each of the psychobiological conceptualisations is that stress plays an important role in determining the course of the skin disorder. However, as indicated in the section on the stress and atopic dermatitis, the evidence supporting this contention is limited to retrospective interviews. The methodological limitations of this approach were described. Retrospective research utilising life events and daily hassles measures have failed to find support for a relationship between stress and atopic dermatitis but these studies are also subject to limitations. Therefore, the next two chapters in this thesis address this issue of the relationship of stress and atopic dermatitis.

Chapter 2 begins with a review of current conceptualisations of stress and evidence from psychoneuroimmunology and psychoneuroendocrinology regarding the potential pathways by which psychological stress affects immune and endocrine functioning. This review concludes that these pathways are consistent with the immunological defects proposed by Szentivanyi (1968) to underlie the key features of atopic dermatitis. Therefore, it is feasible that stress may influence the course of atopic dermatitis through these pathways. However, before this issue can be examined, it is necessary to demonstrate that a relationship exists between stress and the course of the skin symptoms. The past research in this area is reviewed and the major criticisms of these retrospective approaches are outlined. The use of a prospective approach in the form of a daily diary is presented as a means of overcoming the limitations of retrospective approaches. This approach not only allows for the day-to-day reporting of skin condition but also emotional reactions to events, allowing the association of the two to be investigated. Furthermore, as some authors have identified particular emotional reactions such as frustration (Grace & Graham, 1952) or anger (Greenhill & Finesinger, 1942) to be of key importance in exacerbations of the skin symptoms, a daily diary which monitors specific emotions can investigate these competing

hypotheses as well. Finally, the use of such a diary can also determine whether lag periods exist between the occurrence of stressful events and the exacerbations of skin symptoms. Such a lag may exist because of the time required for the physiological reactions to stress to create physiological changes in the skin.

It was hypothesised that the diary technique would reveal a positive relationship between the occurrence of stress and the exacerbation of skin symptoms. This relationship was hypothesised to be nonspecific, that is, a specific emotion such as frustration and anger would not display a greater relationship to skin symptoms than other emotions or stress in general. With regard to the presence of lag periods of effect, it was hypothesised that a positive relationship would exist between stress on Day X and skin symptoms on Day X+1. Given the findings by Jowett and Ryan (1985) which found that having a skin disorder may affect a person's emotional state, the reciprocal relationship was also hypothesised. That is, the state of the skin on a particular day would be related to the emotional state of the next day.

Chapter 3 describes a second study examining the relationship between stress and skin symptoms in atopic dermatitis which utilises the daily diary technique. This study was conducted for three main reasons. First, it provided an opportunity to replicate the first study's finding of a positive relationship between stress and exacerbations of atopic dermatitis. Second, it allowed this relationship to be examined in subjects who were undergoing a period of high levels of stress. In the first study, subjects from the general population recorded their reactions to a fortnight period. There was no attempt to manipulate the level of stress experienced during this period. The subjects in that experiment reported experiencing on average only moderate levels of stress. However, the relationship between stress and exacerbations of skin symptoms may not be linear and a critical level of stress is required to trigger the physiological changes necessary for an exacerbation. Therefore, it was decided to focus on the relationship between stress and atopic dermatitis symptoms in subjects undergoing a naturally occurring stressful situation. The subjects were university students with atopic dermatitis undertaking end of year examinations. It was hypothesised that a positive relationship between stress and exacerbations of atopic dermatitis symptoms would be found to occur. It was also hypothesised that the day before an examination and the day of the examination would be associated with higher levels of skin symptoms than nonexamination days.

The third reason for conducting a second study of the relationship between stress and atopic dermatitis symptoms was to examine this relationship from the perspective of Lazarus' (Folkman & Lazarus, 1980; Lazarus & Folkman, 1984) transactional theory of stress and coping. This theory, which is outlined in chapter 2, emphasises the relationship between the person and the environment in determining stress. Two key components of that interaction are appraisal of the situation and

coping by the individual. Cognitive appraisal and coping have been identified by Lipowski (1977) as a major influence on modern conceptualisations of psychosomatic theory. However, the psychobiological conceptualisations do not consider this issue, nor has any research been conducted in relation to these processes in atopic dermatitis. Therefore, it is an issue worthy of investigation.

Chapter 3 provides a review of the major studies conducted on the relationship between appraisal and coping processes. The research of Folkman and Lazarus (1986) on coping and appraisal in students undergoing college examinations is also reviewed. The current study was hypothesised to reflect similar findings as that of Folkman and Lazarus. Specifically, it was hypothesised that students who perceived an imminent examination as being difficult, uncontrollable, and involving high personal stakes would experience higher levels of threat emotions. Furthermore, it was hypothesised that higher levels of threat emotions would be associated with increased levels of skin symptoms.

A number of studies have also examined appraisal and coping processes in relation to stress and the occurrence of psychosomatic symptoms. These studies are reviewed in chapter 3. Based on this research, it is hypothesised that greater use of the coping strategies of self-blame and wishful thinking would lead to increases in skin symptoms. Conversely, use of planful problem-solving and positive reappraisal was predicted to lead to fewer skin symptoms.

Chapter 4 provides a review of the sizable literature on the relationship between personality and emotional factors and atopic dermatitis. As indicated in an earlier section of this chapter, personality factors were at one time considered to have a major aetiological role in atopic dermatitis. As a consequence, the period from the 1940s to the 1960s was marked by a large amount of research investigating the association between personality and atopic dermatitis. Therefore, this research is of importance due to its significant place in the evolution of thought regarding atopic dermatitis. This research can be divided into four broad categories; those studies that employed psychodynamic and psychoanalytic approaches, those that investigated the role of maternal rejection during infancy, those studies that sought to find a specific personality profile; and those studies that employed psychometric tests to investigate personality structure.

The review critically examines research conducted in each of these four areas. It is concluded that there is considerable variation in the findings of the studies and that no one personality type exists which is associated with atopic dermatitis. However, a number of studies agree on the association of a number of features such as neuroticism, depression, anxiety, and suppressed hostility and atopic dermatitis. These features have been noted to be associated with a number of other psychosomatic disorders, though. Greater consistency is reported in relation to the existence of

personality subtypes of atopic dermatitis sufferers. However, several factors are pointed out with regard to these findings. First, much of the literature is flawed both methodologically and theoretically. Second, the studies often fail to differentiate between enduring personality traits and emotional reactions such as depression and anxiety. Third, many researchers fail to investigate the interrelationships between these various factors. Fourth, the impact of disease on personality and emotional states has received little attention but studies conducted so far suggest that skin disorders have an impact upon emotional functioning and that various diseases may display similar patterns of personality and emotional states. The recently developed concept of a disease-prone personality (H. Friedman & Booth-Kewley, 1987) supports these studies.

At the end of chapter 4, a meta-analytic review is conducted on applicable studies from the body of literature on personality and atopic dermatitis. This meta-analytic review is conducted for two reasons. First, given the difficulty in evaluating the results of the numerous studies reviewed in the chapter, meta-analysis provided an alternative approach to the integration of the research. It was hypothesised that the meta-analytic review would find a similar pattern of results as that obtained in the literature review of the psychometric test studies. Second, many of the variables reported to be associated with atopic dermatitis were the same as those found by H. Friedman and Booth-Kewley (1987) to be associated with other disorders in their meta-analytic review. Therefore, a series of similar meta-analyses of the atopic dermatitis studies enables a direct examination of the applicability of the concept of the disease-prone personality to atopic dermatitis to be determined. It was hypothesised that the results of the meta-analyses would be consistent with the findings of H. Friedman and Booth-Kewley (1987).

Chapter 5 describes an investigation of the association between a number of personality and emotional factors and atopic dermatitis. At first, it would appear that such a study was not warranted. The previous chapter had demonstrated that previous studies had failed to support the concept of an atopic dermatitis personality. Furthermore, the psychobiological conceptualisations of Whitlock (1976) and Faulstich and Williamson (1985) do not regard personality factors to be a major aetiological determinant of atopic dermatitis. Instead, they saw any personality traits associated with atopic dermatitis as consequences of the disorder. Koblenzer (1987, 1988), in contrast to the other conceptualisations, placed greater emphasis on the role of personality, stating that immature personalities were more susceptible to the effects of stress. She felt that although there was no personality pattern specific to atopic dermatitis, there was an increased association between atopic dermatitis and obsessive-compulsive neurosis. She identified suppression of aggression as a feature of atopic dermatitis sufferers but noted this was found in sufferers of other



psychosomatic disorders as well. Therefore, conflict exists between the psychobiological perspectives as to the importance of personality factors. This conflict may be examined experimentally.

There were several other reasons for conducting such a study. First, the literature review and meta-analytic review of the literature had indicated that there was some personality and emotional features that did appear to be associated with atopic dermatitis. Second, there appeared to be justification for the existence of specific subtypes of atopic dermatitis sufferers with regard to personality and emotional factors. However, many of the previously conducted studies were flawed methodologically so the findings regarding these issues were inconclusive. A study which examined these issues while attempting to overcome these methodological limitations would, therefore, be warranted.

The third reason for conducting such a study was to investigate the interrelationships between certain personality and emotional factors. Previous research has suggested that factors such as neuroticism, depression, anxiety, and intrapunitive hostility may be related. Similarly, depression and dependency are thought to be interrelated. Given that these factors have been found to be associated with atopic dermatitis, it would be worthwhile to investigate these factors in a single study and examine their interrelationships. If such interrelationships do exist, the association between anxiety and depression and atopic dermatitis may be due to their association with a third key variable such as neuroticism. If so, such a study would need to control for this fact.

The fourth reason for conducting a study investigating the association between personality and emotional factors and atopic dermatitis is that while conceptualisations of atopic dermatitis do not ascribe a sole aetiological role to personality factors, this does not mean that they are irrelevant. Recent research has indicated that personality factors may operate as moderators of the relationship between stressors and health status. Research related to hardiness, the Type A behaviour pattern, and the disease-prone personality is reviewed as illustrations of this point. Within the transactional conceptualisation of stress, personality factors are postulated to have a mediating role on the appraisal of stakes and coping (Holroyd & Lazarus, 1982). Few studies have investigated the role of personality within this conceptualisation. The first two studies described in this thesis have demonstrated that a relationship exists between stress and atopic dermatitis. If it can be demonstrated that certain personality factors are related to atopic dermatitis, further research could be directed towards examining the potential mediating role of these personality factors within the transactional conceptualisation.

The aim of this experiment was to investigate the association between certain personality factors and emotional states, and atopic dermatitis, while avoiding the methodological limitations of previous research. A number of specific hypotheses were proposed. Based on the research of previous authors, it was hypothesised that two distinct subgroups of the atopic dermatitis sufferers exist. One group was hypothesised to display a suppression or denial of strong emotion, reporting less anxiety, depression, and need of dependency. They are also hypothesised to report displaying less aggression towards others, tending instead to deny aggressive feelings. D. Brown (1967, 1972) found that this type of subject denied the role of stress in affecting the course of their skin complaint. Consistent with their tendency to suppress emotions, he found that their neuroticism scores were low. Based on the findings of D. Brown on the proportion of eczema sufferers showing this pattern, approximately one-third of the atopic dermatitis subjects were predicted to be of this type. The second subgroup is hypothesised to resemble the second type of atopic dermatitis sufferer described by a number of previous researchers. This type of sufferer has been characterised as having high neuroticism scores and high levels of anxiety, depression, and dependency. In contrast to the first subgroup, they do not deny their hostile feelings, but direct them inwards. Again, following the findings of D. Brown (1972) on the proportion of this subgroup in eczema sufferers, approximately two-thirds of the atopic dermatitis sufferers were predicted to show this pattern.

The second set of hypotheses proposed refer to the comparison of the atopic group to the skin-disorder free controls. The literature review and meta-analyses of the personality studies described in the chapter 4 found that atopic dermatitis sufferers scored higher than normal controls on measures on neuroticism, state and trait anxiety, depression, and dependency. It also suggests that rather than expressing anger or hostility, atopic dermatitis sufferers tend to suppress these feelings, turning them in on themselves. This pattern is similar to that of the second subgroup of atopic dermatitis sufferers described in the preceding paragraph. It is possible that this subgroup of atopic dermatitis sufferers are more likely to seek medical help for their skin condition, a point consistent with the research of Costa and McCrae (1987) who found individuals scoring high on neuroticism are more likely to report symptoms and to seek out medical advice. As previous studies often included individuals selected from patients of dermatologists and outpatient departments, a biased sample is likely to have resulted. An alternative explanation is provided by the study by D. Brown (1972). He found that the greater preponderance of the second subgroup of subjects in his study affected the results of comparisons between the eczema group and the dental controls. Given the set of hypotheses regarding the existence of subtypes of atopic dermatitis sufferers, predictions regarding differences between atopic dermatitis

sufferers and skin-disorder free controls are dependent on atopic dermatitis subgroup membership. Therefore, it is hypothesised the second subgroup of atopic dermatitis subjects; if such a subgroup is found to exist; will differ from the skin-disorder free controls by reporting more neuroticism, state and trait anxiety, depression, dependency, and inwardly directed hostility. The first subgroup of atopic dermatitis sufferers are hypothesised to report lower levels of neuroticism than skin-disorder free controls, and to deny the existence of hostile feelings.

Based on the research outlined in chapter 4, it was further hypothesised that the atopic dermatitis and normal control groups would not differ with regard to the extraversion and social desirability. Finally, as other psychosomatic groups have been reported to have a more external locus of control, it was hypothesised that the atopic dermatitis group would report a more external locus of control than the normal controls.

A further set of hypotheses relate to the comparison between atopic dermatitis sufferers and skin-disorder controls. As stated previously, the psychobiological conceptualisations of Whitlock (1976) and Faulstich and Williamson (1985) do not regard personality factors to be a major aetiological determinant of atopic dermatitis. Instead, they saw any personality traits associated with atopic dermatitis as consequences of the disorder. If this is the case, then one would predict that sufferers of a similar skin disorder would show a similar pattern of personality features as atopic dermatitis sufferers. Research reviewed in chapter 4 indicates that atopic dermatitis sufferers differ from skin-disorder control groups by scoring more highly on neuroticism, and state and trait anxiety. They also display more suppression of hostility. Inconsistent findings exist with regard to the dimension of depression. As with the comparisons between atopic dermatitis sufferers and normal controls, these differences are consistent with the characteristics of the second subgroup of atopic dermatitis or eczema sufferers. Therefore, it was hypothesised that this subgroup would show greater levels of neuroticism, anxiety, and suppression of hostility than the skin-disorder controls. Because of the reported association of depression with atopic disorders (e.g., A. Allen, 1989; Nasr et al., 1981), it was hypothesised that this subgroup would score more highly on depression than the skin-disorder group. Finally, it was predicted that they would also score more highly on dependency, because of this factor's association with neuroticism (Hirschfield et al., 1977) and depression (Blatt, Quinlan, Chevron, McDonald, & Zuroff, 1982). No differences were predicted with regard to extraversion or social desirability. It was predicted the first subgroup of atopic dermatitis sufferers would score lower on neuroticism than the skin-disorder group and show a greater tendency to deny hostile feelings. The skin-disorder control group was hypothesised to not differ from the normal controls on any of the measures.

Finally, a further aim of this experiment was to investigate the interrelationships between the various measures. The associations between neuroticism and report of anxiety, depression, dependency, and intrapunitive hostility and between depression and dependency are outlined in chapter 4. Interrelationships between these factors have not been previously described in studies involving atopic dermatitis. It is predicted that report of anxiety, and depression, as well as intrapunitive hostility will be associated with level of neuroticism. Dependency is predicted to be associated with level of depression.

Support was found for the concept of subgroups of atopic dermatitis sufferers that differ on neuroticism, as well as measures interrelated with this personality dimension such as trait anxiety and dependency. Support for the existence of personality and emotional state dimensions that were specific to atopic dermatitis sufferers was not found; either when the sufferers were considered as a single group or as subgroups. Such a finding tended to support the three psychobiological conceptualisations. However, the absence of raised levels of suppressed aggression in the atopic dermatitis sufferers meant that Koblenzer's (1987, 1988) emphasis on this feature was not supported. As no specific features were found, it was not possible to investigate the potential mediating role of any identified personality factors within the transactional conceptualisation of the relationship between stress and atopic dermatitis. Therefore, attention was turned to another aspect of the atopic dermatitis conceptualisations; the role of psychophysiological factors in determining the influence of stress.

In the section on psychophysiological factors and atopic dermatitis earlier in this chapter, it was noted that early researchers had postulated that the autonomic nervous system played a role in determining the symptomatology of atopic dermatitis. A number of studies have been conducted to examine the reactivity of the autonomic nervous system in atopic dermatitis sufferers. These studies provide some support for increased sympathetic arousal in atopic dermatitis sufferers. However, these observations were not without exceptions and were observed on a limited number of stressors such as the cold pressor and changes in room temperature. All three of the psychobiological perspectives of atopic dermatitis acknowledge the potential role of psychophysiological factors in atopic dermatitis. In particular, Koblenzer (1987) and Faulstich and Williamson (1985) emphasised the importance of increased sympathetic tone in atopic dermatitis.

Given the importance placed on this factor by these conceptualisations, it was decided to investigate the psychophysiological reactivity of atopic dermatitis sufferers. There were two issues of interest. First, was there evidence to support the findings of previous research (e.g., Abrams & Farber, 1963; Eyster et al., 1952; Johnson & Winkelmann, 1965) that atopic dermatitis sufferers showed reactivity in response

variables that were relevant to the symptomatology of the disorder such as vasomotor tone and skin temperature? If this could be demonstrated, it would be consistent with the psychophysiological concept of symptom specificity; the tendency for an individual with a specific physiological disorder to respond maximally to stimuli in the same physiological system. This phenomenon has been observed in a number of physiological disorders. Second, did the atopic dermatitis sufferers show evidence of increased sympathetic arousal in response to stressors other than the cold pressor and changes in room temperature? Their response to other tasks that were known to have sympathetically arousing effects was worthy of investigation.

Chapter 6 begins with a description of how principles of psychophysiology have been adopted to describe the potential mechanisms by which psychosomatic disorders develop. The four major types of specificity; stimulus-response, symptom, individual-response, and motivational-response specificity are described and the evidence to support their existence is outlined. The second principle of psychophysiology of relevance is homeostasis; the tendency of individuals to maintain an internal equilibrium or balance (Sternbach, 1966). Chapter 6 describes this principle and outlines the manner in which homeostasis and specificity principles have been used to explain the occurrence of psychosomatic disorders. The evidence for the operation of these principles in studies on psychosomatic disorders is then outlined. Next, the studies examining psychophysiological processes in atopic dermatitis are reviewed. These studies are divided into four areas; studies on the cold pressor, changes in room temperature, psychophysiological investigations of itching, and the effects of the emotional states on the skin. The results of these studies with regard to the principles of symptom specificity, individual-response stereotypy, and homeostasis are discussed. With regard to each of these areas, there is some supportive evidence but it is not conclusive. However, these principles have not been explicitly discussed by the authors of the recent psychobiological conceptualisations of atopic dermatitis. Lipowski (1977) identified the principle of psychophysiological response specificity as an important influence on current conceptualisations of psychosomatic theory. Therefore, if supportive evidence could be found for the operation of such principles in atopic dermatitis, it would advance the current conceptualisations.

The support for increased sympathetic arousal in atopic dermatitis sufferers is also discussed. The available evidence is contradictory and requires further investigation to clarify its relevance. Again, if evidence for its existence is found, it will provide stronger support for those conceptualisations that emphasise its importance. Two psychophysiological studies were conducted to investigate these issues further.

In the first of these studies, the psychophysiological response of atopic dermatitis sufferers to the cold pressor was compared to that of normal control subjects. The cold pressor is a standard test of sympathetic activation. This study was conducted for two reasons. First, there have been conflicting results obtained for the response of atopic dermatitis sufferers to the cold pressor on response variables such as heart rate and blood pressure that are sympathetically mediated. Secondly, only one study (Faulstich et al., 1985) has examined vasomotor responses to the task and these responses (vasomotor response and skin temperature) were recorded from the subjects' fingers rather than affected skin sites.

In this study, the responsivity of the subjects in terms of heart rate, skin temperature, blood volume and pulse amplitude to the cold pressor was recorded. Skin temperature, blood volume and pulse amplitude were recorded from both the hand and affected skin on the arm of atopic dermatitis sufferers and matched sites on the controls. It was hypothesised that the atopic dermatitis sufferers would show greater evidence of sympathetic reactivity in the form of increased heart rate, and decreased finger skin temperature, finger blood volume and finger pulse amplitude in response to the task than the matched controls. With regard to the variables obtained from the affected skin sites in atopic dermatitis sufferers and matched skin sites in the controls, it was predicted that the atopic dermatitis sufferers would display increased arm skin temperature, arm blood volume and arm pulse amplitude compared to the controls. This hypothesis was in line with the findings of vasodilatory responses in atopic dermatitis sufferers to emotionally arousing material (D.T. Graham & Wolff, 1953) and of other skin reactions such as increased exudation rates from blisters (Kepecs, Robin, & Robin, 1951) and flare reactions to histamine injections (Kalz et al., 1957) following discussion of emotionally arousing material.

Unfortunately, an equipment error was identified after the completion of this study which cast doubt on the validity of some subjects' data. Excluding these subjects from the analysis reduced the subject numbers to a level where there was insufficient numbers for any meaningful analysis. It was not possible to repeat the experiment at that point in time. Therefore, the study has been omitted from the thesis.

The second psychophysiological experiment also sought to examine the evidence for increased sympathetic arousal in atopic dermatitis sufferers. As stated previously, the previous research regarding increased sympathetic arousal in atopic dermatitis sufferers has yielded inconsistent results. Furthermore, it has been investigated in a limited number of stressors such as the cold pressor and room temperature. Only the Faulstich et al. (1985) study examined a broader range of stimuli such as intelligence quotient-type questions and imagery of an anxiety-provoking event. Results for these tasks failed to discover a difference from normals. Therefore, it was decided to investigate whether atopic dermatitis sufferers

displayed increased sympathetic arousal to tasks that were known to have sympathetic arousing effects. Evidence of greater sympathetic arousal to these tasks would provide strong support for those psychobiological conceptualisations that emphasise the role of sympathetic arousal. It would also suggest a potential pathway for stress to contribute to exacerbations of the skin symptoms.

In this study, atopic dermatitis and normal control subjects underwent a series of experimental stressors; relaxation, time estimation, orienting response, mental arithmetic, playing a video game, and completing a wire maze. Three of these tasks; the orienting response, mental arithmetic, and the video game; were utilised because of their known impact on the sympathetic nervous system. The relaxation phase was included as a means of investigating if differences existed between the two groups of subjects in their baseline levels of physiological activity, particularly in terms of sympathetic arousal. The two other stressors; time estimation and the wire maze; were included in the study to provide an increased range of tasks.

The reactivity of the subjects in response to the various phases of the experiment were recorded for seven physiological variables. These were: heart rate, skin conductance level, finger blood volume, finger pulse amplitude, digital skin temperature, arm blood volume and arm skin temperature. As in the cold pressor study, these last two measures were obtained from regions of affected skin on the forearm of the atopic dermatitis sufferers and matched sites in the normal controls. To provide an indication of the subjects' perceptions of the tasks, after each phase they rated their levels of stress and arousal on a short checklist sensitive to state changes in these dimensions.

Four major hypotheses were made. First, it was hypothesised that the atopic dermatitis sufferers would display greater levels of baseline sympathetic physiological arousal during the relaxation phase than the control subjects. Previous research had indicated some evidence for this in the form of lower resting skin temperature (Abrams & Farber, 1963; Johnson & Winkelmann, 1965) and digital blood flow (Abrams & Farber, 1963) but Faulstich et al. (1985) had not found supporting evidence. It was hypothesised that this heightened sympathetic arousal would be demonstrated through a higher heart rate, higher skin conductance levels, and evidence of greater vasoconstriction such as lower finger blood volume levels. Second, it was hypothesised that the atopic dermatitis sufferers would display greater sympathetically-mediated reactivity on those tasks that were known to lead to sympathetic arousal. Therefore, it was predicted that the atopic dermatitis sufferers would display greater increases in heart rate and skin conductance levels, as well as evidence of greater vasoconstriction such as lower finger blood volume levels in response to tasks such as mental arithmetic and the video game. The possible existence of a symptom specificity pattern of response was a key area of investigation.

It was predicted that evidence of increased reactivity would not just be limited to heart rate increases but would also be reflected in skin and peripheral vascular responses such as skin conductance, skin temperature, and blood flow. The fourth hypothesis was made in regard to the variables obtained from the affected skin sites in atopic dermatitis sufferers and matched skin sites in the controls. It was predicted that the atopic dermatitis sufferers would display vasodilatory responses such as increased arm skin temperature or arm blood volume compared to the controls on the tasks that were known to lead to sympathetic arousal such as mental arithmetic and the video game. Again, this hypothesis was in line with the findings of vasodilatory responses in atopic dermatitis sufferers to emotionally arousing material (D.T. Graham & Wolf, 1953) and of other skin reactions such as increased exudation rates from blisters (Kepecs, Robin, & Robin, 1951) and flare reactions to histamine injections (Kalz et al., 1957) following discussion of emotionally arousing material.

The thesis concludes with an integration and discussion of the results of the included studies. Several issues are addressed. First, the contribution of the studies to the body of knowledge regarding the psychological aspects of atopic dermatitis is considered. Second, the implications of the findings of the studies are then considered with respect to the psychobiological conceptualisations of atopic dermatitis presented earlier in this chapter as well as Lipowski's (1977) biopsychosocial perspective of psychosomatic disorders and modern conceptualisations of stress. Third, the implications of the findings on the treatment of atopic dermatitis are considered. Finally, the research issues that require further attention are outlined.



**CHAPTER 2**  
**USE OF A DIARY TECHNIQUE TO INVESTIGATE**  
**STRESS-SKIN SYMPTOM RELATIONSHIPS IN**  
**ATOPIC DERMATITIS.**

The role of stress as a precipitant of episodes of psychosomatic disorders is seen by most people as central to the concept of psychosomatic disorders. Along with personality factors, they were assigned a major, if not exclusive, role in the aetiology and maintenance of the disorders. Since the 1950s, the inability of an approach where psychological factors are regarded as the sole determinants of these disorders has been demonstrated. Lipowski (1977) stated that it was time to reject the concept of single factor causality and of unilinear causal sequences, from psyche to soma and vice versa, in favour of "a dynamic interaction of multiple factors occurring in varying constellations and time sequences, and modified by feedback effects " (p. 234). He proposed the biopsychosocial approach to psychosomatic medicine which is in use today. However, just as the concept of psychosomatic disorders has evolved, so has the concept of stress. This has led to confusion among researchers as to what is the best manner in which to regard stress. Three prominent views have emerged; stress as a response, stress as a stimulus, and stress as a transaction (Dorian & Taylor, 1987). These alternate views have stimulated considerable research and will be briefly reviewed.

#### *Stress as a response*

Hans Selye (1966) developed the modern concept of stress and his work on the General Adaptation Syndrome (GAS) heralded the shift from the specificity approaches to the nonspecific approach to stress. Selye (Tache & Salye, 1978) saw stress as "the nonspecific response of the body to any demand made upon it" (p. 5), and that demand was any stimulus that required the organism to readjust.

The GAS consisted of three stages. In the first, increased production of catecholamines and adrenocortical steroid production occurred with an increase in autonomic nervous system activity and a release of vasopressin. If necessary, this alarm stage was replaced by the state of resistance, in which the mobilisation of hormones and continued autonomic nervous system activity occurred in order to maintain defenses against the stressor. In the final stage, continuous exposure to the stressor leads to a state of exhaustion and death. In this theory, the body's defences were mediated through the hypothalamus producing corticotrophic releasing factor and setting up a series of changes in physiological responding on the basis of this. Stress, therefore, was the degree of activation of the hypothalamic-pituitary-adrenal axis, irrespective of the stimulus that provoked it (Dorian & Taylor, 1987; Zegans, 1982).

Selye's approach did much to contribute to knowledge regarding the biochemical, anatomical, and neurohormonal changes that accompanied reactions to stress (Zegans, 1982). The difficulty with the nonspecific approach was that it failed to explain the individual response patterns observed by Lacey and his co-workers (e.g., Lacey, 1950). It also ignored the psychological appraisal of a stimulus which

Mason (1975) showed activated the hypothalamic-pituitary-adrenal system, rather than nonspecific stressful factors.

### *Stress as a stimulus*

In this perspective, stress was seen as an event or set of circumstances that required an unusual response from a person (Coyne & Holroyd, 1981). Meyer (1958) first put forward the view that alterations in life circumstances, such as loss of employment, births and moving house have a profound effect on a person's health. This was investigated in later years by Holmes and Rahe and their collaborators in a series of studies on the relationship between onset and severity of illness and occurrence of life events. Self-report measures such as the Social Readjustment Rating Scale (Holmes & Rahe, 1967) were developed to allow objective recording of such life events. The assumption in this research was that some life events required efforts to cope which were more intense and of longer duration than others. It also assumed that demanding life changes led to faulty adaptive efforts that ultimately caused pathogenic physiological change, though the physiological pathways by which this occurred were not explained (Zegans, 1982).

It will later be seen that while this research has found modest relationships between life events and onset and severity of illness, there has been much criticism of the approach on methodological and theoretical grounds. Critics of the life events approach have pointed out that it fails to take into account intervening reactive variables of the individual such as coping responses, anticipatory reactions, mediating effects of social support, and the long-term context in which the life event occurs, let alone issues such as physical susceptibility to illness, and the interpretation of the change by the individual (Zegans, 1982). If these factors were unimportant, one would not expect to find variability in the amount of life change people can endure without illness yet great variability exists between individuals (e.g., Depue & Monroe, 1986). Therefore, the conceptualisation of stress as a stimulus seems inadequate.

### *A transactional conception of stress*

As early as the 1950s, researchers such as Grinker were critical of psychosomatic models that detached the person from the environment. He proposed a transactional model with the central premise of the need to maintain an internal equilibrium balancing internal needs and external conditions (Grinker, 1953). More recently, this concept of transaction has been adopted by Lazarus (1980) who felt stress could be seen in terms of person-environment transactions that tax or exceed the resources of the person. Under this model, stress is not an environmental stimulus, a characteristic of the person, or a response of the person, but a relationship between the demands of a situation and the capability to deal with them constructively. Therefore, the environment and the person affect, and are affected by, each other. Lazarus defined two crucial processes that mediated the person's relationship to environmental situations; appraisal and coping.

Appraisal referred to the person's continual reevaluation of demands and constraints in transactions with the environment and resources to meet these demands. The key assumption is that these evaluations determine the person's stress reaction, the emotions experienced, and adaptational outcomes. Psychological stress is determined by the evaluation of what is at stake, primary appraisal, and what coping resources are available, secondary appraisal. Coping is defined as efforts that are cognitive, emotional, and behavioural to manage environmental and internal demands and the conflicts between them. Two main functions of coping have been identified; problem- focused coping directed towards the alteration of the person-environment relationship, and emotion-focused coping which is concerned with control of stressful emotions or physiological arousal. Should these two forms of coping fail to deal with the demands upon the individual, then the ongoing physiological arousal may adversely affect health status (Coyne & Holroyd, 1981). Such a conceptualisation is able to incorporate personality variables and social support among others. As such, the transactional model of stress fits well with the current conceptualisations of psychosomatic disorders that emphasise a multidimensional approach.

#### *Physiological pathways for stress*

Early approaches that sought to propose on the pathway by which stress affected the course of atopic dermatitis focused on the autonomic nervous system. The argument that atopic dermatitis sufferers show sympathetic overactivity was suggested by Urbach and Gottlieb (cited in Beerman, 1962) as early as 1946. They felt that emotional arousal possibly led to alterations in the degree of arousal of the autonomic nervous system, or that affective changes led to a lowering of itch thresholds. Kalz, Whittkower, Vavruska, Telner, and Ferguson (1957) also believed there was evidence of sympathetic hyperactivity. Alexander's (1950) nuclear conflict theory hypothesised that stress created by the conflicts specific to each psychosomatic disorder led to specific patterns of arousal in the autonomic nervous system. These patterns of arousal were thought to lead to the development of symptoms.

With the advent of greater sophistication of immunological techniques, the focus of research shifted to immunological functioning in atopic dermatitis. Greater knowledge in this area has meant that the aetiology and course of atopic dermatitis is now considered to be determined by the fundamental immunological, physiological and pharmacological defects described in the first chapter. Although these processes remain poorly understood, it is evident that any theory that seeks to incorporate psychological factors as one of the multiple determinants of the expression of atopic dermatitis must also attempt to delineate not only the transaction between the person and the environment as in the Lazarus model, but also the transaction between the psyche and the soma. In particular, there is a need to identify specific physiological

pathways by which psychological stress impacts upon the immune system in a manner in which is consistent with the current state of knowledge of immune functioning in atopic dermatitis.

In the last 15 years much research has been conducted on the issue of psychosocial influences on the immune system, in particular the relationship between stress, immunity, and illness (for reviews see Baker, 1987; Daruna & Morgan, 1990; Dorian & Garfinkel, 1987; Jemmott & Locke, 1984). This body of research, referred to as psychoneuroimmunology, indicates that reliable immunological changes can be detected as a result of acute naturally occurring psychological stress such as exams, bereavement and so on. Stress has been found to be associated with alterations of humoral and cellular immune mechanisms, decreased responsivity to mitogens and antigens, reduced cytotoxic capability of lymphocytes, and suppressed antibody response (Camara & Danao, 1989). Several pathways by which psychological stress may modulate immune functioning have been identified, some of which relate directly to the identified deficits in atopic dermatitis (Buchbinder & Young, 1986).

#### *Cortisone production*

There is now considerable evidence that cortisone production is increased when animals are under stress, and it is known that cortisone alters the immune response. Glucocorticosteroids depress cellular immunity, decrease antibody production, change blood levels of lymphocytes, macrophages, basophils, eosinophils and neutrophils, inhibit phagocytosis and killing of micro-organisms, inhibit non-specific T-cell mitogenic responses with phytohemagglutinin (PHA) and concanavalin A (Con A), inhibit specific antigen T-cell stimulation, and inhibit production of Interleukin-2 (Buchbinder & Young, 1986). Receptors for glucocorticosteroids have been located on lymphocytes. In atopic dermatitis, there is reduced cellular immunity, reduced levels of lymphocytes, and reduced non-specific T-cell mitogenic responses to PHA and CON A.

#### *Neuro-endocrine relationships*

In addition to glucocorticoids, other hormones are implicated in neuro-endocrine-immune interactions. Peptides released by the pituitary such as beta-adrenergic agents, growth hormone, prolactin, and vasopresin bind directly to lymphocyte cells, while others such as luteinizing hormone act indirectly through stimulation of endocrine gland secretions. Adrenocorticotrophic hormone (ACTH), and thyroid-stimulating hormone act through both mechanisms. Endocrine-gland secretions such as testosterone, estradiol, and progesterone, and thyroxine affect immune functioning in similar ways (Daruna & Morgan, 1990).

The hypothalamic-pituitary-adrenal axis is the best understood of the neuroendocrine immune interactions. Stress has been suggested as a possible influence on hypothalamic control of pituitary secretion of hormones. Acute stress

generally results in an increase in pituitary secretion while chronic stress may result in a decrease in plasma hormone levels due to an inhibition of release rather than an impairment of synthesis by the pituitary. Furthermore, stress-induced secretion of ACTH is associated with concomitant release of beta-endorphin from the same pituitary cells that release ACTH. Synthesis and release of beta-endorphin and ACTH are both inhibited by glucocorticosteroids (Buchbinder & Young, 1986).

It is also been established that there is a lymphocyte-pituitary-adrenal axis that operates in parallel to the hypothalamic-pituitary-adrenal axis. Activated lymphocytes can secrete corticotropin releasing factor and ACTH, and this can be inhibited by glucocorticosteroids. As glucocorticosteroid levels increase under stress and glucocorticosteroid receptors exist on the lymphocytes, the potential for this feedback mechanism to be affected is obvious (Camara & Danao, 1989).

#### *Second messenger systems*

As the cyclic nucleotides cAMP and cGMP have a central role in the atopic state, any substance that can affect these would be able to affect the state of atopic dermatitis. In chapter 1, it was noted that atopic dermatitis sufferers show decreased cAMP responsiveness (Byrom & Timlin, 1979; Champion & Parish, 1986). There is evidence that these cyclic monophosphates are affected by those substances involved in the central mediation of the stress state. Adenylate cyclase is activated by beta-adrenergic catecholamines, hormones, prostaglandins, histamine, and high levels of mitogenic lectins all increase intercellular levels of cAMP and inhibit lymphocyte effector function. Cholinergic stimulation can increase cGMP and increase immunologic function. Parathyroid hormone, vasopresin, somatotrophic hormone (STH) and cortisol can also alter the levels of cGMP or cAMP (Buchbinder & Young, 1986).

#### *Hypothalamic interactions*

The hypothalamus is thought to play a central role in immune system functioning. It integrates endocrine and neural influences on immune functioning. In particular, the paraventricular nucleus appears to play a key role. This is due to the fact that it receives projections from the stria terminalis. Areas involved in processing of stressful events; the neocortex and limbic system; are connected to the stria terminalis and, therefore, can affect the paraventricular nucleus and its output. Brain lesion studies have indicated that damage to these areas can affect immune functioning (Daruna & Morgan, 1990).

The hypothalamus also has a key role in control of the autonomic nervous system. Daruna and Morgan (1990) point out that several neurotransmitters and peptides released by autonomic nervous system fibres have been found to affect immune system functioning through specific leucocyte membrane receptors. These include acetylcholine, adrenalin, noradrenalin, the enkephalins, among others.

Lesions of the anterior hypothalamus which is thought to mediate parasympathetic responses may protect against anaphylaxis, some forms of which are associated with atopic disorders. Lymphocyte studies on animals with anterior hypothalamic lesions showed suppression of in vitro lymphocyte stimulation by PHA and purified protein derivative (PPD) suggesting that the hypothalamus can influence lymphocyte function. As lymphocytes from whole blood, but not isolated lymphocyte cultures, were affected in this fashion, it suggests a role for humoral factor or other cellular influences. Thus, the hypothalamus appears to play a role in both humoral and cellular immune interactions (Buchbinder & Young, 1986). As noted above in the discussion concerning immunological deficits of atopic dermatitis, atopic dermatitis sufferers have both humoral and cellular immunity abnormalities.

#### *Neurotransmitters*

There has been recent evidence to point to a direct central nervous system-immune system interaction. Receptors on lymphocytes and granulocytes for neurotransmitters and peptides have been located. It is known that catecholamines such as noradrenaline and adrenalin, are important in the modulation of atopic disease. Opioid peptides are present in both the central and peripheral nervous systems. There is recent evidence that release of opioid peptides suppresses the cytotoxic activity of natural killer cells. Decreased lymphocyte and natural killer cell activity are features of atopic dermatitis (Buchbinder & Young, 1986).

Therefore, it is clear that possible physiological pathways exist for stress to impact on the immune system and at least some of the resulting effects are consistent with the immunological dysfunction in atopic dermatitis. In cases of exacerbation of atopic dermatitis, it is possible that stress further amplifies this dysfunction, and consequently, the symptomatology. Given these findings, the potential for stress to affect the level of atopic dermatitis symptoms seems obvious. It is somewhat surprising, then, to find that studies on the relationship between stress and atopic dermatitis do not provide a clear picture. Furthermore, those studies that have been conducted are subject to methodological limitations.

#### *Stress and atopic dermatitis*

Three main research strategies have been employed to investigate the relationship between stress and atopic dermatitis. These are: retrospective interviews, life events, and daily hassles. Each of these approaches suffers from limitations that affect the validity of their findings. In the following section, each of the alternate strategies will be briefly outlined, its limitations noted, and the findings of studies relevant to atopic dermatitis utilising this approach will be presented and discussed.

### *Retrospective interview studies*

Evidence regarding the role of stress in atopic dermatitis has come mainly from retrospective interview studies. Greenhill and Finesinger (1942) found that 55 % of their 32 cases felt that emotional events were related to exacerbations. Cormia (1951) reported a correlation between psychological stress and exacerbations in 7 of 9 cases. Whittkower and Edgell (1951) stated there was a correlation between emotional stress and attacks for 77 of their 90 patients. Graham and Wolf (1953) found such a link in 26 out of 31 patients, and this was true for transient episodes of itching and scratching of an hour or so, as well as for major attacks. Other studies (Lynch, Hinckley, & Cowan, 1945; McLaughlin, Shoemaker, & Guy, 1953; Jordan & Whitlock, 1972; Ullman, Moore, & Reidy, 1977) have reported similar findings of a link between emotional stress and onset or exacerbation of atopic dermatitis in many of their cases.

Some studies have been more specific in the sense that they have attempted to delineate more finely the emotions associated with deterioration of the subject's skin condition. Greenhill and Finesinger (1942) found that nervousness, worry, and excitement was reported by 65 %, 55 %, and 37 % of their patients, respectively, to make their skin feel worse. Moreover, 75 % reported that feelings of anger, and either the expression or suppression of this anger, made their skin feel worse. McLaughlin, Shoemaker, and Guy (1953) stated that suppressed hostility led to exacerbations of symptoms. Graham and Wolf (1953) found frustration to be the critical emotion, and that neither hostility nor anxiety was associated with attacks. Lynch et al., (1945) found no unanimity regarding the situations, effect, or the nature of the interpretation that led to exacerbations in their subjects.

The previous research employing this form of retrospective interview indicates that exacerbations or outbreaks of atopic dermatitis are associated with emotionally stressful situations. However, there is no agreement as to the specific nature of this "emotional stress". Furthermore, reliance on the subjects' ability to recall events, the time of these events occurred, and their emotional reaction to them has been criticised by authors such as Whitlock (1976) as being too unreliable for accurate data to be obtained. Results utilising this methodology, therefore, must be regarded with caution.

One investigation which possibly overcame the problems of the retrospective interview approach was conducted by Rush, Storcken, and Obermayer (1957). Five subjects were seen twice weekly for two years by a psychologist and a dermatologist who assessed their emotional state and skin condition. In addition, they were seen for individual interviews between sessions, and also at weekly intervals for four years after the group sessions were discontinued. The researchers found that exacerbations were associated with emotional tension and that the release of this tension led to the remission of symptoms. These exacerbations were found to occur even with the



tension created within the group sessions; deteriorations and improvements being noted in the days following those sessions in which the subject suppressed or expressed his emotions. Such a finding is in agreement with the studies of McLaughlin, Shoemaker, and Guy (1953) and Kalz et al. (1957). Rush et al. (1957) argue that it is the suppression of emotions rather than specific emotional states, identified in some of the retrospective studies, which is critical to the onset and exacerbation of atopic dermatitis. Although it employed small numbers of subjects, the use of a prospective design and close observation of the subjects over a number of years makes this a valuable contribution to the literature.

#### *Life events research*

The methodology for examining the role of stress in disease onset became more structured in 1967 with the publication of Holmes and Rahe's Schedule of Recent Experience (SRE). This self-report checklist covered a wide range of personal, occupational, and financial situations that required some adjustment on the part of the individual, the total number of items checked giving an indication of the total stress experienced in the preceeding months. A second scale, The Social Readjustment Rating Scale (SRRS) (Holmes & Rahe, 1967), recognised that all events were not equally demanding in the amount of adjustment required and assigned weights, or Life Change Units (LCUs), to each event. To quote Rabkin and Struening (1976),

In general, the purpose of life events research is to demonstrate a temporal association between the onset of illness and a recent increase in the number of events that require socially adaptive responses on the part of the individual. The impact of such events is assumed to be additive; more events are expected to have greater effect. The underlying assumption is that such events serve as precipitating factors, influencing the timing, but not the type of illness episode (p. 1014)

These scales, and similar ones subsequently constructed, have been employed to demonstrate an increase in stressful life-events in the preceeding months for individuals suffering from a wide range of psychiatric and physical disorders (for reviews, see Felner, Farber, & Primavera, 1983; Rabkin & Struening, 1976; for early research using this approach see Rahe, Meyer, Smith, Kjaer, & Holmes, 1964). A number of early prospective studies conducted by researchers (e.g., Rahe, 1974; Thurlow, 1971) also found a modest, positive relationship between an increase in life events and disease onset. G. Brown (1981), however, points out that later prospective studies have failed to find evidence of such an association.

### *Criticisms of life-event scales*

Despite their widespread use, life-events checklists have been severely criticised by many researchers (see Andrews & Tennant, 1978; G. Brown, 1981; Creed, 1985; Hudgens, 1974; Paykel, 1983; Perkins, 1985; Rabkin & Struening, 1976; Wershow & Reinhart, 1974). There are several criticisms that have been made. First, due to the large sample sizes used, small correlations are statistically significant; the correlations obtained are often below .30, accounting for only 10 % of the variance (Rabkin & Struening, 1976). Second, Wershow and Reinhart (1974) point to large variances; sometimes as much as three or four times larger than the mean, indicating a random distribution and a lack of central tendency; as a major weakness of much of the data obtained through these scales.

Third, G. Brown et al. (1973) suggest that a serious limitation of these respondent-based scales is the reliance on recall of events, a process that they see as subject to bias. For example, the subject may report more events due to the presence of his disorder in an attempt to explain its occurrence; an effect termed "effort after meaning". This is a limitation noted above with regard to the retrospective interview approach. Wershow and Reinhart (1974) suggest another possible biasing effect of retrospective reporting. They state that there are many trivial items on the SRE and that these are less likely to be remembered as time increases. The consequence of this is a higher score for the more recent periods, not because of more events happening but to more being remembered.

Next, questions have been raised regarding the item content of the scales. Hudgens (1974) pointed out that 29 of the 43 events on the SRRS are often the symptoms or consequences of illness and, as such, are possible sources of operational confounding. For example, the life-event "loss of job" may be a consequence of increased absenteeism or poor work performance due to the insidious development of illness. Dohrenwend et al. (1984) asked a sample of 493 clinical psychologists to rate items from the SRRS as to the degree the item was likely to be a symptom of psychological disorder. They found that a fifth of the items were rated as, at best, equally likely to be a symptom as not.

Finally, there has been considerable criticism of the basic assumption of the SRRS that any event that requires adjustment, regardless of the desirability of the change, may be significant to the onset of disorder. Some (e.g., Mueller et al., 1978; Vinokur & Selzer, 1975) argue that it is the undesirable events that are important, while others (e.g., Stern et al., 1982) argue that events rated as uncontrollable are better predictors of illness.

### *Atopic dermatitis and life-events*

Two studies that have investigated the role of life-stress in relation to eczema or atopic dermatitis have employed the life events approach. Wyler et al. (1971) studied the relationship between the quantity of life change that patients underwent during the two years prior to the onset of their illness. There were 232 patients, suffering from 42 diverse diseases such as schizophrenia, cancer, alcoholism, asthma, gallstones, varicose veins, as well as two skin diseases, eczema and psoriasis. These skin disease groups were collected from an outpatient dermatology clinic and comprised 7 and 6 cases, respectively. All patients were assessed using the Schedule of Recent Experience.

The mean results for the patient group indicated that 36 % of their Life Change Units (LCU) of the previous two years had occurred in the 6 months prior to the onset of illness, and this was also the case for the psoriasis group. For the eczema group, however, only 22 % of their total life change occurred in this period, slightly below that which would have been expected by chance. Furthermore, when the amount of life change the eczema group had experienced was compared to the group mean, it was found to be quite small; approximately 1.5 standard deviations below the mean. By comparison, the psoriasis group was .85 of a standard deviation below the total patient mean. Wyler et al. (1971) commented that many illnesses in their list were chronic, and as such, there was uncertainty as to the time of their onset. Therefore, six independent judges classified the 42 diseases into chronic, acute, and other groupings; eczema and psoriasis joining heart disease, schizophrenia, peptic ulcer among others in the chronic group. Even with this grouping, the eczema patients' mean life change was more than one standard deviation below the chronic group mean, compared to 0.6 of a standard deviation below for the psoriasis group.

The low LCU score for the atopic dermatitis sufferers compared with the other illnesses does not necessarily imply that stressful life changes are not important in atopic dermatitis. It may be they still score higher on LCUs than a normal, healthy individual would. As Wershow and Reinhart (1974) point out, though, it is unclear from Rahe and his associates' work, what exactly constitutes a high LCU. Rahe, McKean, and Arthur (1967) suggest 164 for the prior year is the average LCU for serious illness; a value much lower than the 386 LCU found in the Wyler et al. (1971) study. Nelson, Mensh, Hecht, and Schwartz (1972) also reported higher values. Rahe and Arthur (1968) suggested that 85 LCU in a six month period was concomitant with good health. Wershow and Reinhart (1974) demonstrated that a young person who left college, married, left a part-time job for full-time employment, bought a house, and was expecting a child would experience at least 344 LCU in a year. The atopic dermatitis population in the Wyler et al. (1971) study scored only 52 LCU's for the six month period, well below even the Rahe and Arthur (1974) figure.

Therefore, this study does not support the role of stressful life-events occurring prior to illness onset in atopic dermatitis.

In the other study using a life events measure, Gil et al. (1987) were interested in the relationship between life stress and symptom severity, rather than disease onset, in atopic dermatitis children. They studied 44 children (mean age 6.9 years) with severe atopic dermatitis. The children over twelve, and the parents of those younger, were asked to complete a life events questionnaire for pre-school and school-aged children. The items on the scale included such events as birth of a sibling and moving to a new home. For each subject a frequency score of number of items checked, and a total weighted score was computed. These scores were correlated against measures of symptom severity such as: percent of body affected, course of symptoms (continuous or with periods of remission), intensity of scratching during the day and night (based on parental report) and antihistamine and antibiotic use. These were determined by a specialty nurse blind to the results of the questionnaires. The correlations were all nonsignificant and ranged between  $r = -.13$  to  $.23$ , indicating no relation between life stress and severity of symptoms in childhood atopic dermatitis. Despite this, the study was well-designed with its reliance on a blind examiner of skin condition and objective measures of health status.

One other study deserves a brief mention. Rahe et al. (1964) in a study of life events and illness included a sample of 39 newly acquired skin diseases (the diseases being unspecified) from dermatology inpatients at two hospitals. They completed the SRE for the ten years previous to onset of symptoms. The results indicated that between 1/4-2/3 of all change experienced in the ten years antedating illness onset was encountered in the final 2 1/2 years. While one would expect 1/4 of events to occur in this period, one would not expect 2/3 of events to occur in this period by chance. It is unfortunate that the skin diseases examined were not specified. Due to the reasons outlined above with regard to reliability of recall, however, the validity of these findings can be questioned.

In summary, Wyler et al. (1971) did not find support for an association between stressful life events and onset of symptoms in atopic dermatitis. The study by Gil et al. (1987) failed to find any relationship between recent life events and severity of symptoms in atopic dermatitis in children. The study by Rahe et al. (1964) did find supportive evidence of a relationship between life events and skin disorders but the skin disorders were unspecified.

#### *Daily hassles*

Lazarus and his colleagues, in their investigation of the relationship between stress and onset of disorders, have concentrated on the relatively minor stresses or, as they refer to them, hassles that occur in everyday life. They (Kanner, Coyne, Schaefer, & Lazarus, 1981) define hassles as "the irritating, frustrating, distressing

demands that to some degree characterise everyday transactions with the environment" (p.3). According to these researchers, to have an effect on physical or psychological health, hassles might occur in a chronically high proportion, in greater numbers during a period of heightened sensitivity, or be of particular significance to the individual. In Kanner et al.'s (1981) view, the observed relationship between major life events and health may be due to life changes altering the pattern of daily hassles in a detrimental way. For example, divorce may lead to new demands such as making one's meals, handling finance, reduced companionship and so on. Other hassles such as traffic jams and work-related pressures may be due to the lifestyle of the individual and the environment in which he lives, and therefore independent of life changes. Kanner et al. (1981) state that the counterparts of hassles, daily uplifts, may serve as emotional buffers to the effects of hassles. These uplifts are the positive experiences that occur throughout the day, such as relief at hearing good news and so on. Their assumption, then, is contrary to the "life change regardless of desirability" approach of the SRRS.

Kanner and his associates (Kanner et al., 1981) compared the ability of their Hassles Scale to predict symptoms of psychological distress with a measure of major life changes. The correlation between Hassles and symptoms was in the order of  $r = .49$  to  $r = .6$ ; significantly higher than that between life events and symptoms. Life events only infrequently added to the power of prediction in a stepwise regression analysis, even when entered first into the equations. Furthermore, life events and the Hassles and Uplifts Scales intensity scores were not correlated significantly to each other. The results of this study have been criticised, however, with Dohrenwend and associates (Dohrenwend et al., 1984; Dohrenwend & ShROUT, 1985) presenting data to suggest that the Hassles scale is heavily confounded with the symptom measure, and the results obtained by Kanner et al. (1981) merely reflect the effect of this confounding. This point has been disputed by Lazarus, DeLongis, Folkman, and Gruen (1985), however.

Another form of confounding occurs when the predictor and criterion variables are both correlated with a third variable. D. Watson and Pennebaker (1989) stated that the correlation found when both stress levels and health status are determined by self-report is an artifact due to the confounding of both measures with negative affectivity, a term these authors claim is analogous to the construct neuroticism. (Other authors such as Costa and McCrae [1987] state that the constructs are similar but not identical.) That is, the tendency to experience and report negative mood states such as anger and anxiety affects both the perception and reporting of both subjective estimates of stress and health status. D. Watson and Pennebaker (1989) found that the Hassles scale and self-report physical symptom measures were both significantly related to a measure of negative affectivity. Furthermore, when hierarchical multiple

regression analyses were performed with the health complaint measures as criteria, it was found that negative affectivity accounted for the bulk of the variance when entered first into the equation and even when the Hassles scores were entered first, negative affectivity still made a substantial contribution. Aldwin, Levenson, Spiro, and Bosse (1989), however, found that although there was a significant relationship between neuroticism and hassles and life events, and between neuroticism and psychological symptoms, path analysis showed that both hassles and life-events still contributed independent variance to psychological symptoms. Costa and McCrae (1987) suggest that to control for confounding with neuroticism, objective indices of health status such as mortality, immune level functioning and other physical signs and symptoms, should be utilised instead of self-report health measures (Costa & McCrae, 1987; D. Watson & Pennebaker, 1989). Such indices were incorporated in the one study that examined the relationship between daily hassles and atopic dermatitis.

*Daily hassles and atopic dermatitis*

Gil et al. (1987) examined the relationship between common everyday problems and measures of symptom severity such as amount of body involvement, continuous versus remitting course, intensity of scratching during the night and day, and antihistamine and antibiotic use. The checklist assessed daily problems encountered by children in three major areas; school, family, and social relationships. Children over twelve, and parents of those children who were younger, completed the checklist for both the occurrence of problems in the previous six months and a rating of the severity experienced by that event. From this, a total problem score and a distress score were derived. The results indicated that neither of these two scores correlated with any of the measures of symptom severity. As Gil et al. (1987) point out, though, the lack of a relationship may be due to global evaluations of everyday problems being too imprecise to evaluate stress in these children. Furthermore, both common everyday problems and life events may be related to symptom severity in older children only. As mentioned previously, this was a well-designed study utilising blind examiners and objective indices of health status.

This study does have its limitations, though. The checklist used was modified from one developed for use with college students and there is no reporting of any checks on validity and reliability. As it required retrospective reporting of events and intensity of distress; sometimes not even by the subject; the problems outlined above with this type of reporting are possible sources of contamination. Prospective reporting would have been a superior approach.

In summary, all of the past research on the relationship between stress and atopic dermatitis, with the exception of the Rush, Storken, and Obermayer (1957) has been retrospective in nature. Studies employing retrospective interviews have found evidence of a relationship, but this method of research is subject to serious flaws. Of

the studies which have employed more structured methods of investigation, such as life-events and everyday problems neither has found evidence supporting stress and atopic dermatitis. The study by Rahe et al. (1964) found evidence for an association between life events and the onset of skin disorders, but it is not clear whether atopic dermatitis was one of the disorders studied.

#### *An alternative approach*

By the use of a prospective design, it may be possible to overcome the limitations of retrospective studies, such as the reliance on memory. This would lead to more reliable determination of the temporal association between stress and symptoms, and allow the cause and effect relationship between these two variables to be examined more closely. Costa and McCrae (1987) have suggested the use of daily symptom diaries to reduce the possibility of distortions due to retrospective recall.

This method of data collection has been used extensively in collecting information regarding patterns of illness, injury, and morbidity (for a review, see Verbrugge, 1980). The daily diary technique has also been utilised with chronic pain patients (Budzynski, Stoyva, Adler, & Mullaney, 1973). One form of daily diary suitable for the requirements of the current study is the Psychological Diary described by Robbins, Meyersburg, and Tanck (1974).

The diary consisted of a series of questions concerning two broad areas. First, there were a number of questions relating to health issues; the principal question pertaining to the occurrence of ten symptoms such as head cold, weakness, nausea, and skin flareup. Second, there were a number of questions concerned with psychological issues. These included interpersonal situations and a number of items covering emotional reactions such as anger, depression, and anxiety considered by past researchers (Grace & Graham, 1952; Alexander, 1950) to be relevant to psychosomatic disorders.

The subjects in the Robbins et al. (1974) study were 85 predominantly female undergraduate students who completed the diary each night for a week, giving in total 595 diaries. Three principal factors were extracted. The first was essentially the list of ten symptoms; the other two factors being concerned with interpersonal stress and depression. As predicted, those subjects with high interpersonal stress scores reported more symptoms. The relationship between interpersonal stress and symptoms was fairly general, in that high stress scores were associated with higher scores for the symptoms of dizziness and back pain. For three other symptoms, the relationship was close to significant. Skin flareup was not related to a high score on interpersonal stress.

The use of the diary technique allowed Robbins et al. (1974) to investigate the pattern of relationships between interpersonal stress and symptoms across days. The data suggested that while the level of interpersonal stress was higher for symptom

positive days, there was no tendency for the day before the occurrence of symptoms to be higher in such stress. If this had been the case, it would have indicated the possible existence of a "trigger" period, and provided stronger evidence that the interpersonal stress led to the symptoms. There was also no tendency for days following the occurrence of symptoms to be high in interpersonal stress. This study, therefore, does not allow one to speculate on the cause-effect relations between these two factors.

Robbins and Tanck (1982) replicated and extended the diary methodology. In their study, 110 undergraduates completed a form of the diary for 10 consecutive days, and responses to each item were summated over the period. Factor analysis revealed three principal factors whose item composition was very similar to the factors reported by Robbins et al. (1974). For the Robbins and Tanck (1982) study, however, both the Interpersonal Stress and Depression-Isolation factors correlated positively with symptoms; the higher correlation was displayed by the Depression-Isolation factor.

There are several reasons why the Robbins et al. (1974) prospective diary approach appears to be a suitable technique for investigating the relationship between emotional reactions to situations and the course of atopic dermatitis symptoms. First, the skin of atopic dermatitis sufferers can rapidly change so that day-to-day reporting of skin condition will reveal considerable fluctuations. Second, the research of Greenhill and Finesinger (1942), Whittkower and Edgell (1951), and others suggested that emotional reactions are linked to onset or exacerbation of the skin symptoms. Daily reports of both emotional reactions to events and state of the skin will provide stronger evidence of this association. Third, previous research has found conflicting results with regard to whether or not deterioration of the skin is associated with specific emotional reactions. For example, Grace and Graham (1952) stated in their specificity-of-attitude theory that frustration was the critical emotion. Others, such as Greenhill and Finesinger (1942), have found feelings of anger, either expressed or suppressed, to be of more importance. A daily record of specific emotional reactions such as frustration, suppressed anger, and anxiety, will allow for the possible comparison of the relationship of these various reactions to the fluctuating course of the skin symptoms. Those reactions which display the greatest correlation with the course of skin symptoms will then be able to be determined and the validity of the various theories can be assessed. Finally, it will enable the temporal relationship between emotional reactions and atopic dermatitis symptoms to be more closely examined. If there is a lag period of a day or more between the emotional reaction and the occurrence of symptoms, such a lag period would be stronger evidence of the causal role of emotional stress in atopic dermatitis.



## Method

### *Design*

In the current study, each subject's diary was conceptualised as a separate test of the hypothesis that stress is associated with the exacerbations of symptoms of atopic dermatitis.

### *Materials*

For the current experiment, a modified form of Robbins et. al.'s (1974) diary was used. This form included all of the questions related to the Interpersonal Stress and Depression-Isolation factors, and the Social Gratification factor identified by Robbins and Tanck (1982), as well as a question concerned with the occurrence of the eight symptoms investigated by the authors. Two of the symptoms; chest pain and indigestion; from the Robbins et al. (1974) version of the diary were deleted from the 1982 study; the first due to its infrequent occurrence in the first study, and the second for unspecified reasons. As in their first version of the diary, space was provided for elaboration of affirmative responses to the questions. A copy of the diary is included in Appendix A.

Limited data exists regarding the reliability and validity of the diary. None of the studies by Robbins and his colleagues utilising the diary (Robbins, 1974, Robbins et al., 1974, Robbins & Tanck, 1973; 1982; 1984) describe how the items were selected. However, examination of the items in each of the four factors; Interpersonal Stress, Depression-Isolation; Social Gratification, and Physical Complaints; indicates reasonable face validity. With regard to construct-related validity, some supporting evidence exists regarding correlations with other measures. Robbins and Tanck (1984) administered the Beck Depression Inventory (BDI) (A. Beck, Ward, Mendelson, Mock, & Erbaugh, 1961); a measure of depression with good reliability and validity data (A. Beck, Steer, & Garbin, 1988); to 100 university students and asked them to complete the diary over ten days. They reported the correlations between scores on the BDI and the individual items comprising the Depression-Isolation factor. The mean correlation was  $r = .32$  (standard deviation [ $SD$ ] = .16). Six items displayed a significant correlation, indicating a moderate degree of construct validity. With regard to the Interpersonal Stress factor, the mean correlation with the BDI was  $r = .12$  ( $SD = .14$ ); only three items correlated significantly. The correlation between the BDI and the Depression-Isolation factor is evidence of convergent validation; the correlation of a measure with a variable with which it should theoretically correlate (Campbell & Fiske, cited in Anastasi, 1982).

Further evidence related to the issue of construct validation comes from the study reported in the next chapter. As part of this study, eight university students with atopic dermatitis undergoing end-of-year examinations completed the diary each night

for the entire examination period. They also completed a measure of stress and arousal, the Stress-Arousal Checklist (SACL) (King, Burrows, & Stanley, 1983) each night. Studies on this checklist (e.g., King et al., 1983, Wilson-Evered & Stanley, 1986) indicate that it displays adequate reliability and validity as a measure of these variables. For each subject, the score on the diary's Interpersonal Stress factor and the Stress scale of the SACL was determined for each day of the examination period. From these, a correlation coefficient for the two variables was derived. (These correlation coefficients are shown in Table 3 in the next chapter.) The mean correlation was  $r = .42$  ( $SD = .23$ ). This suggests that the Interpersonal Stress factor score has moderate construct validity.

With regard to the issue of reliability, there is little available data. As stated previously, Robbins et al. (1974) studied 85 university students who completed the diary each night for a week. The researchers undertook two principal axis factor analyses of the subjects' responses to the items utilising the varimax rotation method. In the first of these, each of the 595 individual diaries was treated as a separate observation. In the second approach, each subject's scores on the individual items was summated for the week and this sum was then factor analysed. The two approaches yielded essentially the same result. Three principal factors were found corresponding to Interpersonal Stress, Depression-Isolation, and Physical Complaints. This result suggested that the items contributed to common factors which were stable and reliable whether examined on a single day or over the period of a week.

In the Robbins and Tanck (1982) study, a slightly revised version of the diary was completed by 110 university students over a ten day period. Again their responses were analysed by principal factor analysis utilising varimax rotation. This factor analysis revealed four principal factors, the first three of which closely corresponded to those identified by the first study. The fourth factor consisted of items related to social gratification. Therefore, the factor structure of the first study was replicated utilising a second sample of subjects, suggesting that the factors were robust and reliable in nature. Furthermore, the strength of the correlations between the factors and their constituent items were of an adequate level. For Interpersonal Stress, the mean correlation was  $r = .69$  ( $SD = .12$ ), for Depression-Isolation the correlation was  $r = .60$  ( $SD = .06$ ), and for Physical Complaints the correlation was  $r = .56$  ( $SD = .16$ ). The data from these two studies provides some evidence that the diary was a reliable measure.

The current study's diary differed from the one utilised by Robbins and his colleagues in two respects. First, for those questions concerned with emotional reactions, such as feeling anger, expressing anger, feeling tense and so on, subjects answering affirmatively were asked to rate the intensity of their reactions on a three

point scale (1 = *a little*, 2 = *somewhat*, 3 = *a great deal*). Robbins and Tanck (1982) note that in their version of the diary most questions were answered with a *yes-no* format. However, some unspecified items were answered using scaled alternatives. This suggested that the use of scaled alternatives in answering questions would not affect the reliability of the diary. This belief was supported by pilot investigations which found no differences occurred with regard to endorsement of items whether a *yes-no* or a scaled alternative format was adopted. The second change was the addition of a question to allow for a more specific assessment of the subject's skin condition. This question followed the list of eight symptoms and read, 'If you answered yes to 'Skin Flareup', indicate how bad your skin is now.' Subjects rated their skin condition on a three point scale (1 = *a little*, 2 = *moderately*, 3 = *severe*). This was done so as to maintain consistency with the scaled alternative format adopted in answering the questions regarding intensity of emotions. There was no objective investigation during the pilot stage as to how accurate subjects were able to report skin condition through this scale. However, as noted in the discussion section of this chapter, itchiness and soreness are dominant features of the disorder and these are subjective experiences that only the individual can reliably rate. Subjects in the pilot stage of this study reported no difficulties in rating their skin complaint on the scaled alternatives.

As well as completing the diary, the atopic dermatitis sufferers also completed a sheet that contained questions regarding the history of their disorder, their perception of whether stress affected their symptoms, associated atopic disorders, and treatments tried. A copy of this sheet is included in Appendix B.

### *Subjects*

The subjects in this experiment were 54 atopic dermatitis sufferers recruited from two sources: referrals from dermatologists and general practitioners, both acquainted with the required subject characteristics, and volunteers responding to media advertisements. The advertisements stated clearly that subjects were to be medically diagnosed as suffering from atopic dermatitis. When contacted, volunteers were questioned via a semi-structured interview with regard to the history of their disorder, its bodily distribution, treatments used, and occurrence of associated atopies (asthma, hay fever) to ensure that they suffered from atopic dermatitis. If there was any doubt concerning the disorder based on this information, their doctor was contacted for confirmation (two cases), or they were excluded from the study (three cases).

The 54 subjects (21 males, 33 females) were of an average age of 30.4 years old ( $SD = 10.8$  years), and had suffered from the disorder for an mean of 19.6 years ( $SD = 13.5$  years). Of these subjects, 39 or 72 % believed that stress had a role to

play in the course of their disorder. For comparison purposes, a group of 35 skin-disorder free subjects (13 males, 22 females; mean age = 27.2 years,  $SD = 10.3$  years) recruited from undergraduate psychology classes also completed the diary.

#### *Procedure*

The subjects who volunteered for the study were seen either at the experimenter's office, or at their home or place of work. This depended on what was most convenient for them. Subjects were informed that the purpose of the study was to investigate the relationship between emotions and their skin symptoms. The word "stress" was not used in any explanation of the purpose. However, the biographical details sheet did ask a question regarding the relationship between the first outbreak of the skin symptoms and important events; "Was this outbreak related to some important event? (e.g., change of school, moving house, etc.)" A second question on the sheet asked, "Have any of these times [of the skin problem returning] been due to stressful events". Subjects were not asked directly by the experimenter as to whether they believed emotions affected the course of their skin complaint. If subjects made such a comment on their own behalf, it was acknowledged but further discussion was limited as much as possible. Subjects were not informed of the specific hypotheses under investigation in the study.

The subjects were informed as to the content of the diaries and to the fact that they were to complete them each night before retiring. They were specifically instructed to avoid missing a night and then attempting to recall events at a later stage in order to complete the diary. Both groups completed the diary each night for a fortnight. During the course of the fortnight, subjects were not reminded by the experimenter to complete the diaries. At the first meeting with subjects a date was set on which the diaries would be collected or returned. Those who did not return the diaries at this point were contacted by telephone or letter and a date set for the return of the diaries. Four atopic dermatitis sufferers (three males, one female) failed to return their diaries, as did five control subjects (four males, one female), a compliance rate of 93 % and 86 %, respectively. These subjects did not differ significantly from those who did return the diaries.

This left a total of 50 atopic dermatitis sufferers and 30 control subjects. Before any analysis was performed, one of the atopic dermatitis sufferers' diaries was excluded due to a lack of variation in the skin condition throughout the fortnight period, rendering the diary unamenable to analysis by the approach chosen. Lack of variation was defined as the same score on the question regarding severity of skin condition for each of the fourteen days. Any diary with less than ten of the days (70 %) completed was considered to be incomplete and was excluded. One of the control subjects' diaries was excluded for failing to complete the minimum required number of days.

## Results

All the diaries were scored by hand by the experimenter. To ensure that the experimenter was blind to the identity of subjects, each diary was identified only by an assigned subject number.

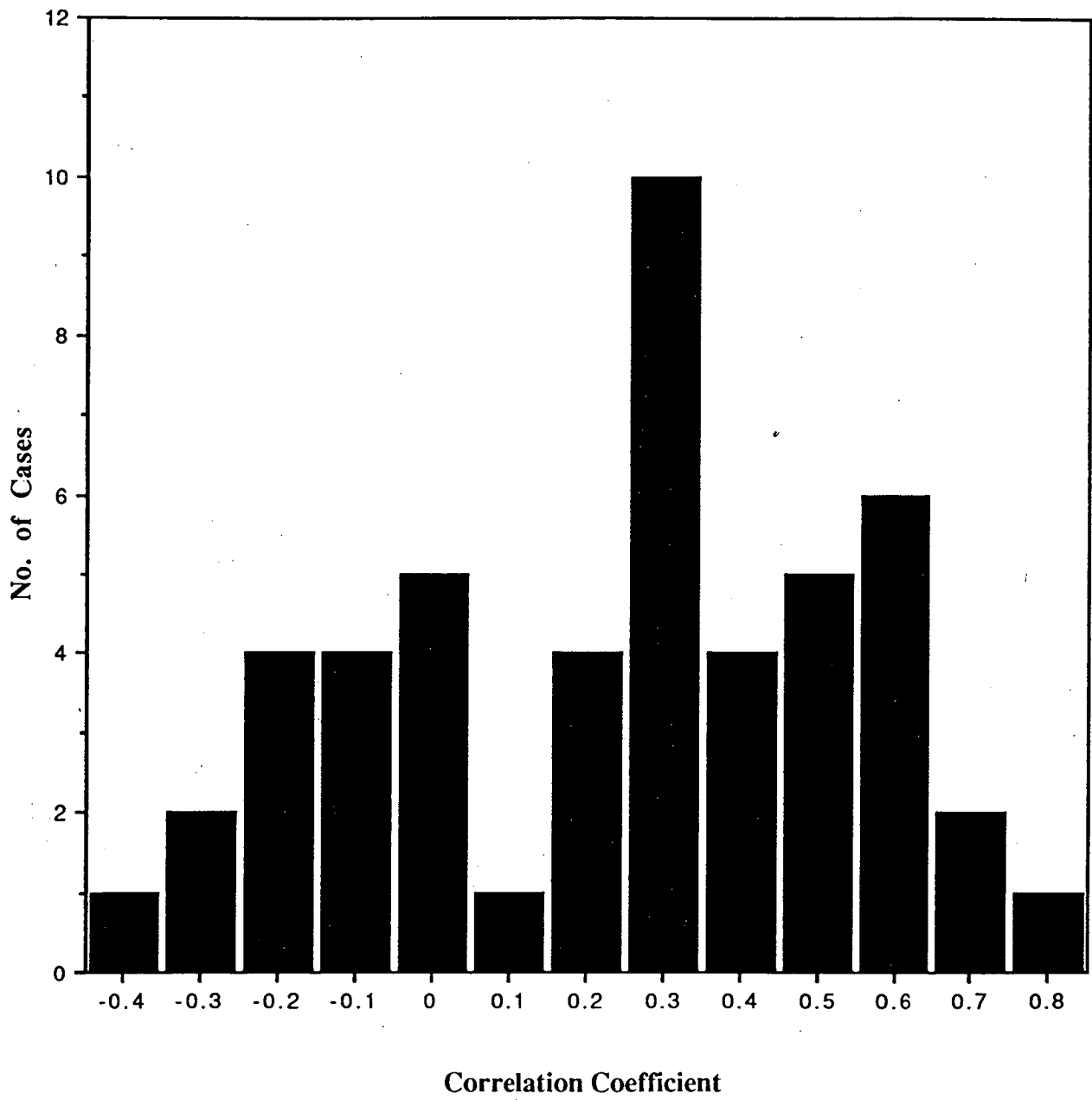
As stated in the design section, each subject's diary was conceptualised as a separate test of the hypothesis that stress is associated with the exacerbations of atopic dermatitis symptoms. This approach was taken because the literature reviewed in the first chapter indicates that atopic dermatitis is a disorder with multifactorial determinants. Although stress is considered by the three psychobiological conceptualisations to be a major determinant of exacerbations, it is not the only one. Given this, it is probable that the relative importance of stress as a determinant varies across individuals as well as across separate exacerbations within an individual. Therefore, it was decided to begin the analysis by examining the strength of this relationship for each individual subject rather than the overall strength of the relationship for the group as a whole.

The first step in the analysis of the data was to determine for each subject the correlation between the diary factor of Interpersonal Stress and the severity of the skin symptoms for each day of the fortnight period. The Interpersonal Stress score was the total number of items in this factor answered affirmatively, as described by Robbins et al. (1974). The symptom score was simply the subject's rating of their skin condition. For most subjects, this gave fourteen pairs of ratings; some subjects having failed to complete each day of the diary. Using these series of paired ratings, a correlation coefficient for each subject was determined. The distribution of these coefficients is shown in Figure 1.

As can be seen from Figure 1, most of the 49 diaries displayed a positive association between increases in interpersonal stress and increases in skin symptoms; the mean correlation being  $r = .22$  ( $SD = .31$ ) for the diaries. Due to the small number of observations for each subject, the critical value for a significant relationship was  $r = .51$ ; as can be seen from Figure 1, only 12 subjects reached this level.

A correlational analysis was performed for the Depression-Isolation factor scores with the skin symptom scores. The distribution of correlation coefficients was similar to that obtained for the Interpersonal Stress factor shown in Figure 1, with  $r = .21$  being the mean correlation.

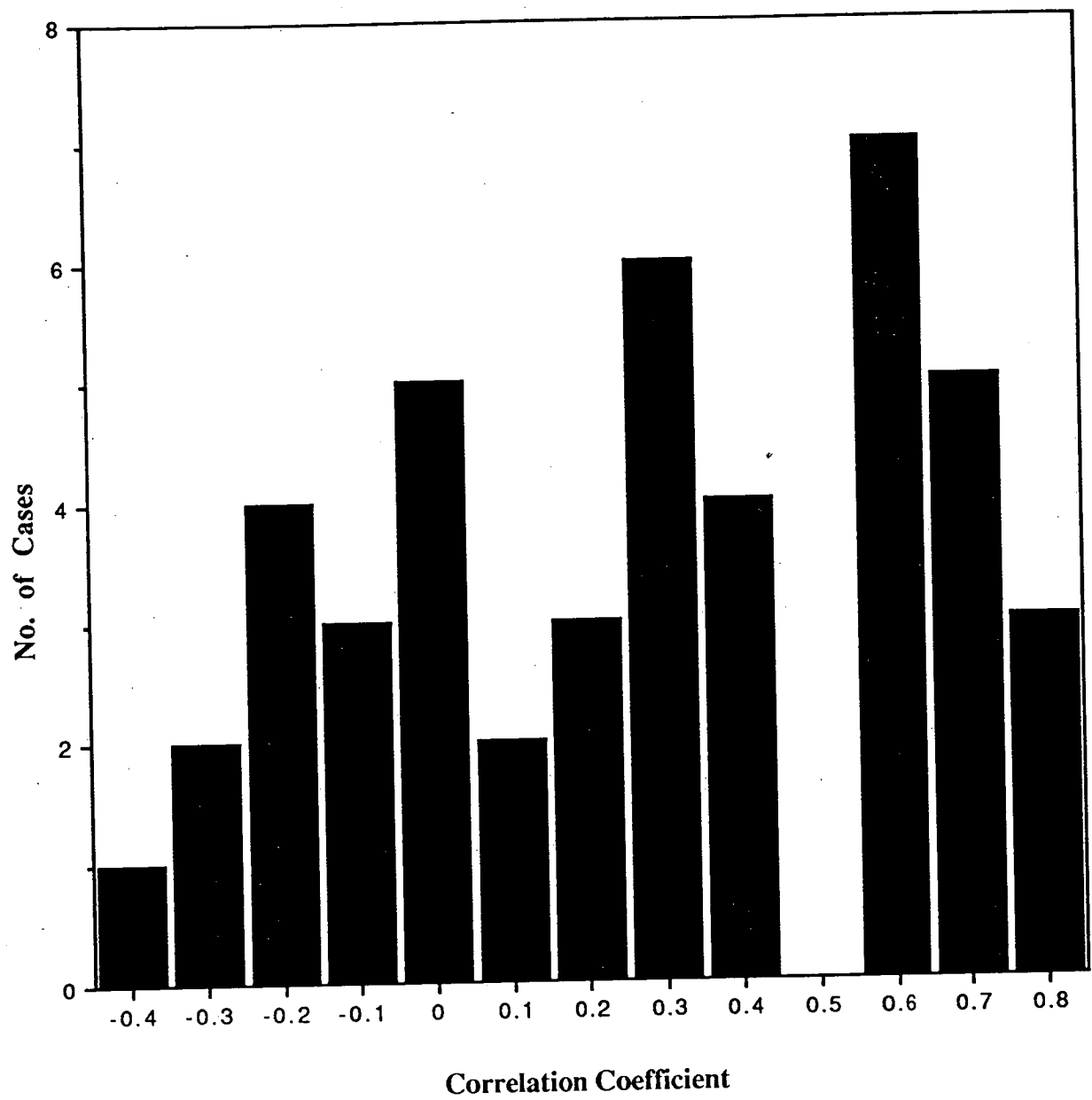
Robbins et al. (1974) examined the validity of the claims of the specificity theorists such as Alexander (1950) and Grace and Graham (1952) who believed that specific psychological factors such as emotional conflicts or attitudes were related to specific symptoms. They found no evidence to suggest that occurrence of symptoms were related to specific emotional reactions such as anxiety or anger. Instead they



*Figure 1.* Distribution of Interpersonal Stress- skin symptom correlation coefficients ( $N = 49$ ).

found that the relationship between the emotional states and symptoms was relatively nonspecific. However, Robbins et al.'s (1974) subjects were university students rather than sufferers of specific disorders such as atopic dermatitis so their analysis does not constitute an adequate test of this hypothesis. Therefore, in order to test the validity of claims of researchers such as Graham and his colleagues (Graham & Wolf, 1953; Grace & Graham, 1952) and Greenhill and Finesinger (1942) that specific emotional reactions are associated with exacerbations of atopic dermatitis, the correlations between the intensity scores for each of the emotions in the Interpersonal Stress factor and the skin symptom scores was calculated. To determine a "Suppressed Anger" score, the difference between the intensity of felt anger and expressed anger for each day was calculated and correlated with skin symptom intensity. In each case, the obtained distribution of results was similar to that shown in Figure 1. Of the differing emotional reactions, intensity of anxiety and tension related the most strongly to the skin condition score, with a mean  $r = .27$  ( $SD = .35$ ); the distribution of correlations is shown in Figure 2.

As stated previously, because the small number of observations recorded for each subject, there was a resulting high critical value for demonstrating a significant relationship. As a consequence, only 12 of the subjects reported a significant correlation between Interpersonal Stress and skin symptoms. However, this finding is misleading, suggesting a positive relationship existed for a small number of subjects only. In fact, approximately half of the subjects reported a correlation of  $r = .30$  or more. Therefore, in order to determine whether the distribution of correlations obtained from the subjects for each of the above analyses was significantly greater than that expected by chance, a meta-analysis (Glass, McGraw, & Smith, 1981; Rosenthal, 1984) was performed. This approach was chosen because of the study's conceptualisation of each subject being a separate independent study. Meta-analysis is designed to evaluate the overall significance of a series of independent studies. Put simply, meta-analysis is a means of combining the results of independent studies in order to derive a quantitative integration in the form of a single set of numbers (Cooper, 1979; H. Friedman & Booth-Kewley, 1987). The meta-analytic technique employed was that of the unweighted Stouffer method (Rosenthal, 1978), whereby an overall  $Z$  score is obtained, and whose significance can be evaluated. This specific method was chosen for two reasons. First, the method utilises correlational data in its analysis. This meant that the current study's data was already in a readily accessible form for analysis by the Stouffer method. Second, the Stouffer method was used in chapter 4 for the purposes of performing a series of meta-analyses on the literature concerning the relationship between personality and atopic dermatitis. Its use in the current study meant that a consistent approach was adopted. The results of the seven meta-analyses are shown in Table 1.



*Figure 2.* Distribution of anxiety/ tension- skin symptom correlation coefficients (N = 45).



Table 1

*Summary of meta-analyses relating skin condition to emotional reactions*

Factor/ Item	No. of cases <sup>a</sup>	Z	Mean <i>r</i>	(SD)
Interpersonal stress	49	6.233*	.23	(.31)
Anger felt	46	4.473*	.16	(.31)
Anger expressed	45	2.945**	.09	(.33)
Anger felt- anger exp. <sup>b</sup>	43	2.751**	.11	(.27)
Frustration	43	5.048*	.19	(.35)
Anxiety/ tension	45	7.189*	.27	(.35)
Depression/ Isolation	49	5.417*	.21	(.45)

<sup>a</sup>The number of subjects varies due to a lack of change in the intensity of the emotional reaction for some items in some cases, preventing a correlation co-efficient from being calculated. <sup>b</sup>Anger felt- anger exp. = anger felt- anger expressed.

\*  $p < 0.001$

\*\*  $p < 0.01$

As can be seen from Table 1, the seven meta-analyses revealed significant positive relations between skin symptoms and each of the emotion intensity items, the Interpersonal Stress factor score, and the Depression-Isolation factor score. This relation was highly significant for five of the seven analyses; the item related to tension/ anxiety displaying the strongest positive pattern.

As a further analysis of the data, the Interpersonal Stress, and the Depression-Isolation factors' scores, and the skin symptom scores for each subject were summated to give a single fortnight figure for each factor. The correlations between Interpersonal Stress and symptom score, Depression-Isolation and symptom score, and Depression-Isolation with Interpersonal stress were then calculated. This analysis was chosen so as to provide a comparison with the approach adopted by Robbins and his colleagues. The correlations for Interpersonal Stress-skin symptoms, Depression-skin symptoms, and Interpersonal Stress-Depression were all positive and significant ( $r = .41$ ,  $df = 47$ ,  $p = .004$ ;  $r = .47$ ,  $df = 47$ ,  $p = .0008$ ;  $r = .627$ ,  $df = 47$ ,  $p < .0001$ , respectively). By comparison, Robbins and Tanck (1982) found that the correlation between Interpersonal Stress and report of all physical complaints in their subjects was  $r = .25$  and that between Depression-Isolation and physical complaints was  $r = .43$ . Therefore, Interpersonal Stress showed a substantially better relationship with skin symptoms in the current study than with physical complaints in their study.

The next set of analyses conducted were concerned with the possible existence of lag or trigger periods before the occurrence of stress manifested itself as symptoms. This analysis was conducted for several reasons. First, the possibility of such lag periods was raised by Robbins et al. (1974). They examined the levels of stress on days preceeding the occurrence of physical symptoms. Although they found raised levels of stress on the day of symptoms, there was little evidence of increased stress on the day prior to symptoms. However, they felt the issue was worthy of further investigation. Second, comments by some of the subjects during the prestudy interviews indicated that they believed that such lag periods existed between stress and exacerbations of their symptoms. Third, the current study's correlational design does not allow any conclusions to be drawn about causal relationships between the occurrence of stress and skin symptoms on the same day. As will be discussed later, any positive correlation between the two may have occurred for a number of reasons. The existence of lag periods would provide stronger evidence of the role of emotional stress in atopic dermatitis.

The technique utilised to examine the strength of the relationship with a lag period was lag sequential analysis (Sackett, 1974; Sackett, 1980). This technique was chosen as it provides a stronger test for the existence of lag periods than the method employed by Robbins et al. (1974). In their study, they failed to consider that a

positive relationship is likely to exist between stress on Day X and stress on Day X + 1. A similar relationship may also exist for physical symptoms. Such relationships or autocorrelations need to be controlled for in the examination of lag periods. Lag sequential analysis provides a technique to control for such autocorrelations. The particular form of lag sequential analysis employed was that of the  $Z_M$  statistic described by Faraone and Dorfman (1987). This statistic allows the null hypothesis of no cross-dependence (that factor one does not predict subsequent scores on factor two) to be rejected. The analysis does not, however, provide an estimate of the magnitude of effect. Due to the small number of observations available for each subject in the current study, the techniques outlined by Faraone and Dorfman (1987) for the estimation of the magnitude of observed cross-dependence were not able to be utilised.

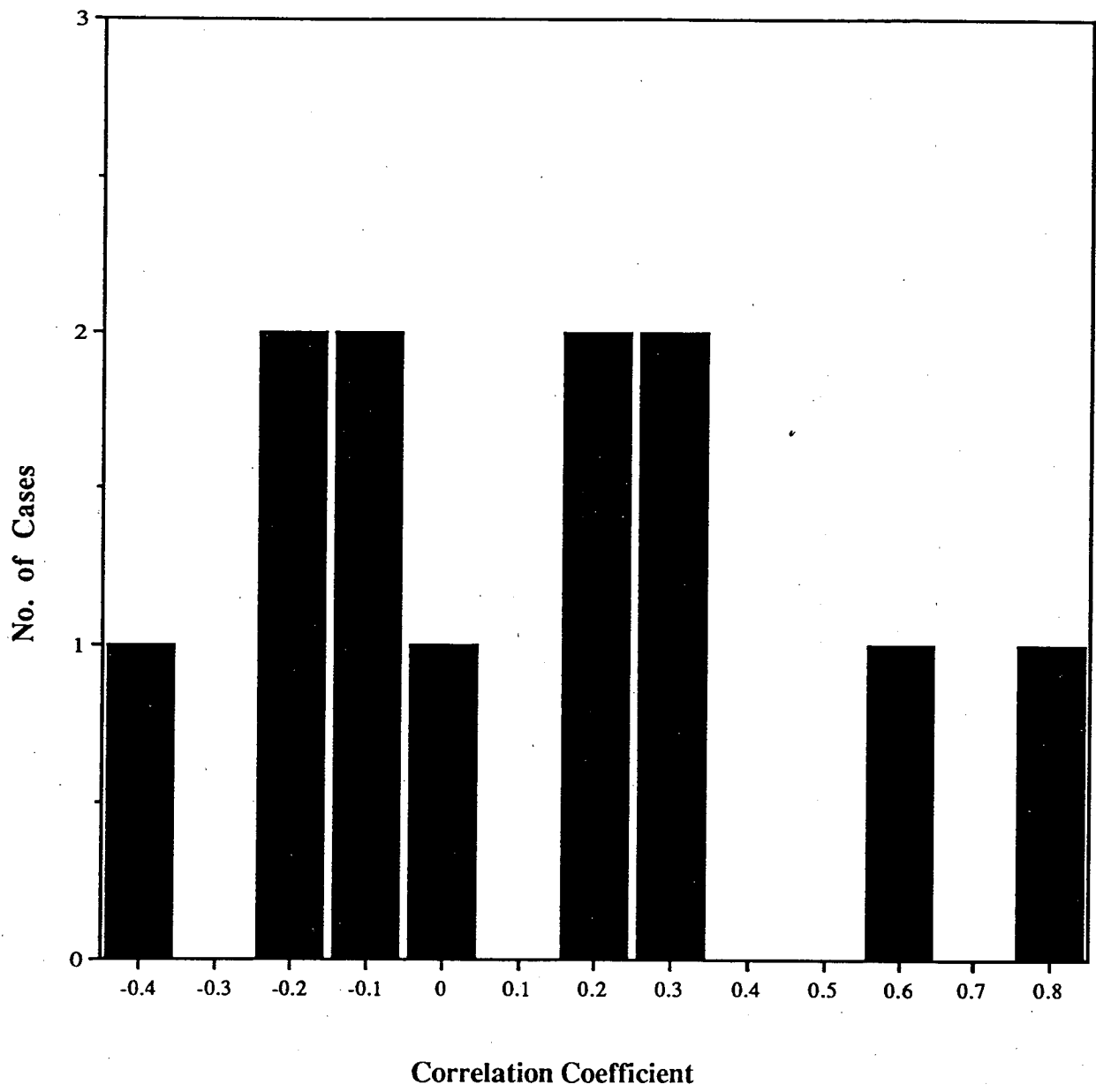
Two lag sequential analyses were conducted. One examined the ability of interpersonal stress to predict skin symptoms on the next day for each subject, the other the ability of skin symptoms to predict interpersonal stress on the next day. A lag of one day was chosen first, because any effect of cross-dependence between interpersonal stress and skin symptoms would most likely be greatest at a lag of one day and, second because the use of any more than a one day lag would lead to a small number of observations on which to base the analyses. Diaries included in the analysis were required to contain at least 11 consecutive days of data. A total of 44 diaries met this criteria.

As a first stage in these analyses, the auto-correlations for the skin symptom scores, the correlation between scores on Day X and Day X+1, for skin symptoms and the Interpersonal Stress factor score, were calculated for each subject. The mean correlation coefficient for the interpersonal stress scores ( $r = -.016$ ,  $SD = .288$ ) indicated that reporting of interpersonal stress on Day X did not predict reporting of interpersonal stress on Day X+1. However, for the skin symptom scores, a positive relation did exist ( $r = .277$ ,  $SD = .301$ ). This would be expected as severe skin symptoms on Day X would not heal quickly enough for there to be no symptoms on Day X+1. The overall distribution of results for the relationship between interpersonal stress on Day X and skin condition on Day X+1 was examined via the unweighted Stouffer method of meta-analysis outlined above. This indicated that the observed distribution was positive and significantly greater than that which would be expected by chance ( $Z = 1.75$ ,  $n = 44$ ,  $p = .04$ , one-tailed). Meta-analysis of the distribution of results for the relationship between skin symptoms on Day X and interpersonal stress on Day X+1 also revealed a positive pattern that was significantly greater than that expected by chance ( $Z = 2.46$ ,  $n = 44$ ,  $p = .007$ , one-tailed).

Two similar lag sequential analyses were conducted for the relationship between the Depression-Isolation factor score and the skin symptom score. These analyses were able to be conducted for 43 cases. The autocorrelation for the Depression-Isolation factor was minimal ( $r = .03$ ,  $SD = .26$ ). When skin symptoms were lagged one day with the scores for the Depression-Isolation factor (that is, the Depression-Isolation score on Day X with the skin symptom scores on Day X+1), the meta-analysis indicated that the pattern of results was not significantly greater than that expected from chance ( $Z = -.1977$ ,  $n = 43$ ,  $p = .42$ , one-tailed). This result indicated that depression on Day X was not predictive of skin symptoms on Day X+1. The meta-analysis of the pattern of results for the lag sequential analysis with depression lagged one day with skin symptom scores (skin symptom score on Day X and Depression-Isolation score on Day X+1) revealed that the relationship was strongly positive ( $Z = 3.303$ ,  $n = 43$ ,  $p = .0005$ , one-tailed).

On the biographical information sheet, twelve of the subjects stated that they believed stress did not lead to exacerbations of their skin condition. It was of interest to examine if this belief was supported by the data from their diaries. Therefore, the relationship between interpersonal stress and skin condition was investigated for this group separately. The correlations between Interpersonal Stress score and skin symptom score for each subject were summated; the mean correlation coefficient was  $r = .127$  ( $SD = .36$ ). The distribution of coefficients for this "nonstress" group is shown in Figure 3. A meta-analysis of the subjects' coefficients revealed that the distribution was significantly different from that which would be expected by chance ( $Z = 2.098$ ,  $n = 12$ ,  $p = .017$ ).

The degree of interpersonal stress and depression reported by the atopic dermatitis sufferers was compared to that of the sample of skin disorder-free controls. This analysis was conducted to provide a comparison of the relative levels of stress and depression reported by the atopic dermatitis sufferers and a group of skin disorder free controls. The occurrence of significant differences between the groups **would** indicate the need to examine possible reasons for this difference. For example, if the control subjects reported less stress, it could suggest that the presence of skin symptoms itself was a source of stress for subjects? For each subject, the total Interpersonal Stress score for each day was summated to give a fortnightly total; in cases where there was less than fourteen scores, the summated score was adjusted accordingly. A similar score was obtained for the total Depression-Isolation factor. The results for the atopic group as a whole, the nonstress atopics, and the controls are shown in Table 2.



*Figure 3.* Distribution of Interpersonal Stress- skin symptom correlation coefficients for the nonstress group ( $N = 12$ ).

Table 2  
*Fortnight Interpersonal Stress and Depression-Isolation scores for the complete atopic group, nonstress atopics, and control subjects*

Group	Interpersonal Stress		Depression-Isolation	
	Mean	SD	Mean	SD
Atopics (n = 49)	40.6	16.7	30.6	13.3
Nonstress atopics (n =12)	31.3	11.7	27.9	10.8
Controls ( n = 29)	46.9	16.6	38.0	11.8

T-tests indicated that the nonstress atopic dermatitis sufferers reported less interpersonal stress than the controls ( $t = 3.04$ ,  $df = 39$ ,  $p < .005$ ), and that both the atopic dermatitis sufferers as a whole, and the nonstress atopic dermatitis group reported less depression-isolation than the controls ( $t = -2.50$ ,  $df = 76$ ,  $p < .05$ ; and  $t = -2.55$ ,  $df = 39$ ,  $p < .05$ , respectively).

Previous research has shown that constructs such as negative affectivity and neuroticism affect both the perception and reporting of both subjective estimates of stress and health status (Costa & McCrae, 1987; D. Watson & Pennebaker, 1989). Because of the correlation design of the study, and the fact it employed self report of both stress levels and skin condition, it was possible that the observed relationship between these two variables was the result of their shared relationship with a third variable such as neuroticism. Therefore, it was necessary to examine whether this was a possible factor affecting the results. To investigate this possibility, the method of D. Watson and Pennebaker (1989) was utilised. As part of the study on personality factors and atopic dermatitis to be reported in chapter 5, 45 of the subjects had completed a measure of neuroticism, the Eysenck Personality Inventory (EPI) (Eysenck & Eysenck, 1964). A correlation matrix of the compressed fortnight skin symptoms and Interpersonal Stress scores, and their Neuroticism score for the EPI was obtained. As predicted, Interpersonal Stress and skin symptoms were correlated ( $r = .37$ ), as were Interpersonal Stress and Neuroticism ( $r = .43$ ). Skin symptoms and Neuroticism were also correlated, but to a lesser degree ( $r = .19$ ). A stepwise regression analysis with skin symptom scores as the variable to be predicted indicated that even when Neuroticism was forced into the equation first, ( $r = .193$ ,  $r^2 = .037$ , adjusted- $r^2 = .015$ ,  $F(1, 43) = 1.66$ ,  $p > .10$ ), Interpersonal Stress still added independently and significantly to the regression equation ( $r = .375$ ,  $r^2 = .141$ , adjusted- $r^2 = .1$ ,  $F(2, 42) = 3.45$ ,  $p < .05$ ). Furthermore, when Interpersonal Stress was entered first ( $r = .374$ ,  $r^2 = .14$ , adjusted- $r^2 = .12$ ,  $F(1, 43) = 6.97$ ,  $p < .05$ ), Neuroticism did not add any further to the explanation of the variance.

## Discussion

The relationship between interpersonal stress and skin symptoms will be considered first, followed by the relationship between depression and skin symptoms. After this, there will be an attempt to integrate these findings into a hypothesised statement of the relationship of these variables. Finally, the results of the comparison between the atopic dermatitis sufferers and the skin disorder-free controls will be discussed.

The results of the same day analysis show a positive relationship between the Interpersonal Stress factor and skin symptoms. The mean correlation between interpersonal stress and skin symptoms was  $r = .22$  overall and this is of the same order of magnitude reported in retrospective studies on the relationship between various physical illnesses and life events (Rabkin & Struening, 1987). The relationship between cardiac risk factors such as smoking or cholesterol intake, and heart disease is also of this order of magnitude (H. Friedman & Booth-Kewley, 1987).

This positive relationship could be due to a number of reasons. First, interpersonal stress causes an increase in the skin symptoms as a result of the physiological consequences of arousal. Second, an increase in skin symptoms, and the accompanying itchiness, soreness, and unsightliness of the subject's skin, makes sufferers more liable to be stressed by interpersonal situations. Third, higher levels of interpersonal stress lead the subject to perceive their skin condition as more severe than it is in reality. Fourth, severe skin symptoms cause the subject to evaluate more negatively their reaction to interpersonal events of the day. Last, the relationship is due to some third factor such as response style or, as Robbins et al. (1974) referred to it, self-revelation. These possibilities are all viable explanations and are not mutually exclusive.

Lag sequential analyses for the relationship between interpersonal stress and skin symptoms indicated that both were predictive of the other: higher levels of interpersonal stress on Day X predicted higher levels of skin symptoms on Day X+1, and higher levels of skin symptoms on Day X predicted higher levels of interpersonal stress on Day X+1.

By consideration of lag periods, some viable explanations for a causal positive relation between two factors can be discounted. It is difficult to accept that the skin symptoms can cause the interpersonal stress of the previous day, or lead to the negative evaluation of the previous day's interpersonal events. The alternative that high interpersonal stress on Day X leads to a more negative evaluation of the subject's skin condition on Day X+1 is also less likely as it appears more plausible that this negative evaluation would occur when rating the skin on Day X. If these explanations



are rejected as improbable, then the two remaining viable hypotheses are that higher levels of interpersonal stress cause an exacerbation of skin symptoms on the following day or that the observed relationship is due to some third factor. The physiological effects of stress may require some lead time before causing an exacerbation of the skin disorder. These skin changes may begin as sensations of itchiness that are scratched in the sleep and result in visible lesions the next day.

Using a similar argument, the observed positive relationship between skin symptoms on Day X and interpersonal stress on Day X+1 appears most likely to be due to the presence of skin symptoms leading to increases in interpersonal stress the following day.

The existence of a reciprocal relation between interpersonal stress and skin symptoms over a one day lag period suggests that the positive relation between the two factors on the same day is the consequence of a complex interaction. Interpersonal stress appears to be both a cause of the skin symptoms, and is itself caused by the discomfort of the complaint creating a lower tolerance to the demands of others. These two factors may also be related in less direct ways. As suggested above, high levels of interpersonal stress may lead to a more negative evaluation of the skin symptoms, and severe skin symptoms may lead to a more negative evaluation of the emotional reactions to the day's events. The validity of these various explanations can not be evaluated within the current design.

Analysis of the 49 diaries indicated that there was a significant positive relationship between the Depression-Isolation factor and skin symptoms. The mean correlation between the variables was  $r = .21$ ; a figure similar to that reported between the Interpersonal Stress factor and skin symptoms.

The results of the lag sequential analyses conducted between skin symptoms and the Depression-Isolation factor score indicated the absence of a reciprocal relationship. Skin symptoms on Day X were predictive of Depression-Isolation scores on Day X+1, but the reverse was not found to be the case. The two most likely explanations for this relationship are that the presence of skin symptoms causes depression on the next day, or that it is due to the presence of some third factor. This first explanation is clearly plausible. The presence of a visible, irritable disorder that constantly reoccurs is understandably depressing. A small number of subjects commented in the space allowed for the elaboration of their answers that they were indeed depressed as a result of their skin condition. Typical comments from one subject were, "I felt like a leper" and "I was depressed when I discovered how I looked with a rash everywhere." This is consistent with the research of Jowett and Ryan (1985) who found that 38 percent of their 32 eczema sufferers reported experiencing depression in reaction to their complaint. The lack of a reciprocal relationship in the lag sequential analyses for these factors suggests that if depression

is causally related to skin symptoms, it must produce the necessary physiological changes in the skin more rapidly than interpersonal stress. It is not easy to see why this should be the case.

The failure to find a reciprocal relationship between the Depression-Isolation factor and skin symptoms in the lag sequential analyses allows the positive relationship between these two variables on the same day to be re-examined. It appears likely that this relationship is due to the skin symptoms contributing to the depression, rather than the reverse being the case. The diaries were examined in order to determine whether the space allocated for elaboration of responses for questions ever referred to feelings of depression as a consequence of the skin symptoms. While this was true occasionally, most comments indicated that feelings of depression coincided with the events evoking affirmative answers in the Interpersonal Stress factor. The mean individual day-to-day correlation between the Interpersonal Stress factor and the Depression-Isolation factor was  $r = .627$ .

When the scores for each factor were compressed into a single fortnight score, the correlations between the Interpersonal Stress factor and skin symptoms ( $r = .41$ ) and the Depression-Isolation factor and skin symptoms ( $r = .47$ ) were higher than those reported in Table 1. In the former method, each subject provided a pair of data points which were summated across subjects to give an overall correlation between the two variables for the group. In the latter method, the subject's fourteen daily scores for each variable were used to determine an individual correlation. These were then summated across subjects to give a mean correlation of the strength of the relationship between the two variables. Whereas the latter method relied on same-day relations in order to derive a correlation for each subject, it is possible that the former method allowed the extra effect of the delayed relationships demonstrated by the lag sequential analyses to be incorporated. This would explain the greater degree of correlation found when the data was compressed.

Two other sets of results from this study deserve comment. These are: the relationship between specific emotions and skin symptoms, and between interpersonal stress and skin symptoms for the nonstress atopic dermatitis sufferers. The results presented in Table 1 above suggest that all the items concerning the occurrence of specific emotions in the Interpersonal Stress factor contribute to the relationship between interpersonal stress and skin symptom intensity, rather than the observed relation being a result of only one or two items. It also indicates that, in contrast to the claims of Graham and Wolf (1954), Greenhill and Finesinger (1942) McLaughlin, Shoemaker, and Guy (1953) and others, the relationship between emotional stress and exacerbations of atopic dermatitis is nonspecific: anger (felt or expressed), frustration, tension and anxiety, and depression are all related to symptom intensity. The item related to tension and anxiety displayed the strongest relationship, with a mean  $r = .27$ ,

which was stronger than the Interpersonal Stress factor as a whole. While the correlational design of the current study does not allow specification of any causal relationship between these emotions and increases in skin symptoms, some or all of the emotions may well be a consequence of the skin symptoms.

Twelve of the atopic dermatitis sufferers felt that stress did not lead to an exacerbation of their skin symptoms. This group's Interpersonal Stress-skin symptom correlation was analysed separately from the whole atopic dermatitis group, and although reduced, a positive relationship (mean  $r = .127$ ) was still evident. The existence of a positive relationship between interpersonal stress and skin symptoms does not necessarily imply that the nonstress group were mistaken in their belief that stress did not have a role to play in the course of their skin disorder. The positive relationship may be entirely due to the skin symptoms contributing to a reduced tolerance to potentially stressful interpersonal situations. Other explanations are that the presence of skin symptoms may lead the subject to evaluate more negatively the interpersonal events of the day, or that high levels of interpersonal stress lead to more negative evaluations of the current state of the skin condition.

Despite the significance of the positive relationship obtained in this study, one may still ask why many subjects demonstrated no relationship between stress and skin symptoms or why in those subjects who did, the relationship is not stronger. There are several potential reasons. First, atopic dermatitis is a multi-determined disorder. Psychological factors are only one possible reason for fluctuations in the skin condition. Allergic and climatic factors have also been implicated (Champion & Parish, 1986; Ryan, 1987). It was beyond the limits of this study to control for the influence of these factors in the course of the subjects' skin condition. It is, therefore, possible that exacerbations of an individual subject's skin complaint occurred at times throughout the fortnight period as a result of allergic or climatic factors. These "non-psychological" variables would also affect the skin on days of low psychological stress, resulting in a decrement in the correlation between interpersonal stress and the skin condition. Furthermore, psychological factors other than stress may have accounted for some exacerbations. In chapter 1, the evidence regarding the role of scratching behaviour in the course of the disorder was examined. This evidence suggested that scratching behaviour in atopic dermatitis is maintained by operant conditioning (e.g., Jordan & Whitlock, 1972) or social learning principles (e.g., Gil et al., 1988). While anxiety may play a mediating role in the occurrence of scratching behaviour (e.g., Jordan & Whitlock, 1974), it may not be the only factor. Therefore, increases in skin symptoms in some subjects over the fortnight may have been the result of increased scratching due to such factor as climatic changes or overheating whilst sleeping.

Methodological reasons may also account for the low number of subjects reporting a significant relationship. Limited data was available regarding the validity and reliability of the diary as a measure of interpersonal stress. It is possible that the diary did not accurately measure what it purports to measure. This will require further examination. It is also possible that while the diary does provide a reliable and valid measure of interpersonal stress, this is too narrow a definition of stress. Many of the subjects in the study may have experienced stress in ways that were not related to interpersonal situations and, therefore, these stresses were not recorded on the diary's items. Students preparing important reports or individuals experiencing financial difficulties are possible examples of such events. As a consequence, the association between stress and skin symptoms would appear to be lower than it is in reality. This is of relevance to the study described in the next chapter where the relationship between a stress such as university examinations which has little interpersonal content and the occurrence of skin symptoms is investigated.

A final methodological consideration regarding the low relationship between stress and skin symptoms concerns the reliability of the subjects' self report of skin condition. While this approach was adopted due to its convenience and the fact that some elements of the condition such as soreness and itchiness can only be reliably rated by the sufferer, other methods may have been more reliable. For example, use of objective indications such as amount of corticosteroid creams or antihistamines used may have provided a more reliable indication of skin condition.

From a theoretical point of view, several possibilities exist for explaining the obtained results. Firstly, potential mediators of stressful events such as social support (Cohen & Wills, 1985), and appraisal and coping responses (Folkman & Lazarus, 1980) were not examined in the current study. A study that incorporates these important variables may find evidence of a stronger relationship. This issue is partially addressed in the next chapter with the consideration of the role of appraisal and coping processes. Second, personality factors may also be of importance. Those subjects who believed that stress did not affect the course of their disorder also reported, as a group, lower levels of interpersonal stress. It is possible that the tendency to deny the role of stress and the occurrence of stress reflects certain dimensions of these subjects' personality. For example, low scores on the personality dimension of neuroticism are associated with low report of negative affective states such as anxiety and depression. Furthermore, D. Brown (1967, 1972) found in his study on eczema sufferers that low scorers on neuroticism also tended to deny the role of stress in the course of their disorder. The nonstress subjects in this study tended to also report lower levels of stress and depression. It is possible that this reflects personality traits like low neuroticism which need to be investigated further. This issue of personality will be

considered further in the literature review of personality studies in chapter 4 in the personality study reported in chapter 5.

A further reason for an imperfect correlation may be that the relationship between interpersonal stress and skin symptoms is nonlinear. There may be a critical level of stress that must be experienced before the physiological effects of arousal trigger the required changes in the skin necessary for an attack of the skin disorder. The mean Interpersonal Stress factor score for the atopic dermatitis sufferers for the fortnight was 40.6, the maximum stress possible was 126. This indicates that, as a whole, the group was experiencing only moderate levels of stress. This is one of the shortfalls of the study; the diaries sampled a randomly selected fortnight of the subjects' lives and the occurrence of stressful situations in that period was not controlled. Had periods of both high and low stress been experienced by all subjects then a stronger relationship between interpersonal stress and atopic dermatitis may have been found.

A closely related issue is that of lag periods; the current study found that the relationship between stress on Day X and skin symptoms on Day X + 1 was significantly greater than that expected by chance. Six of the subjects showed a significant relationship between the two factors over this lag period. Importantly, four of these six subjects did not display a significant relationship between stress and skin symptoms on the same day. Therefore, the number of subjects demonstrating a same day relationship between the two factors may not necessarily reflect all subjects in whom stress and skin symptoms are significantly correlated. Lag periods must be taken into consideration.

There are several ways in which this study could be improved in order to further delineate the relationship between stress and symptoms of atopic dermatitis. First, it may prove beneficial to study a group of atopic dermatitis sufferers over a period when it is known they will be experiencing higher levels of stress. University and senior high school examinations are a good example of such a stressful period. Second, future studies should investigate the role of appraisal, coping responses and social support in mediating the potential effects of situations in the subjects' lives. Once these factors are taken into consideration, a stronger relationship may be revealed. Finally, controlling for the possibility of alternative explanations for the existence of a positive relationship between interpersonal stress and atopic dermatitis symptoms will increase the confidence with which we can state that stress can cause or aggravate atopic dermatitis.

One of the alternative explanations put forward was that high levels of interpersonal stress on a particular day lead a person to more negatively evaluate their skin condition. A possible solution to this problem would be to have a dermatologist rate the skin condition daily; however, this would only be possible in an inpatient

setting. Ratings by a significant other such as a spouse is a more practical solution but even this is limited to assessment of visible signs such as redness, sores, and scratching. Major aspects of the disorder such as the intensity of soreness or itchiness, can only be rated reliably by the sufferer himself. The alternative that high levels of skin symptoms lead one to more negatively evaluate the events of the day, is similarly hard to control. It would be impossible for another person objectively to rate the degree of frustration, anger, or anxiety experienced to daily events.

The possibility that any observed relationship is due to a third factor such as neuroticism or negative affectivity was examined. The possibility of such confounding was likely in this study as both the stress and symptom levels were measured by self-report. This hypothesis was able to be tested, however. As predicted, Interpersonal Stress and skin symptoms were correlated, as were Interpersonal Stress and Neuroticism. Skin symptoms and Neuroticism were also correlated, but to a lesser degree. A stepwise regression analysis with skin symptom scores as the variable to be predicted indicated that even when Neuroticism was forced into the equation first, Interpersonal Stress still added independently and significantly to the regression equation. Furthermore, when Interpersonal Stress was entered first, Neuroticism did not add any further to the explanation of the variance. In contrast to the study by D. Watson and Pennebaker (1989) the findings of this study were not an artifact due to confounding effects. In future studies, however, in order to control for this confounding with neuroticism, objective indices of health status such as immune level functioning and other physical signs and symptoms utilised by Gil et al. (1987) should be utilised instead of self-report health measures.

The next study in this series examines the relationship between the stress associated with a specific event; university examinations; and atopic dermatitis symptoms. The use of a daily diary is a feature of this second study. However, it also incorporates the Lazarus and Folkman's (1980) concepts of coping and appraisal in a preliminary study of the relationship of these processes to the course of skin symptoms.

**CHAPTER 3**  
**EXAM STRESS, APPRAISAL, AND COPING PROCESSES:**  
**THEIR RELATIONSHIP TO SKIN SYMPTOMS IN ATOPIC DERMATITIS.**

The previous chapter described the use of a daily diary to record reactions to interpersonal stress as well as occurrence of physical symptoms in sufferers of atopic dermatitis. In particular, the relationship between interpersonal stress and fluctuations in their skin condition was examined. The results indicated that a significant relationship existed between the experience of interpersonal stress and exacerbation of skin symptoms for 12 of 49 of the subjects. A meta-analysis of the results, however, revealed that the pattern of results obtained across diaries was significantly different from that which would have been expected by chance. Furthermore, this relationship was found not to be due to the confounding effects of a potential third variable, neuroticism. A similar pattern of results was obtained for the relationship between the diary's other major factor, the experience of feelings of depression and isolation, and exacerbation of skin symptoms.

Analyses of lag relationships gave further support to the proposition that stress may play a causal role in exacerbations of atopic dermatitis symptoms, and it may itself be affected by an individual's skin condition. The relationship between feelings of depression and exacerbations of the skin disorder, however, appeared to be more a result of increases in skin symptoms leading to increases in depression rather than the reverse.

In discussing the results of this study, it was suggested that the diary's use of a fortnight sample of the lives of atopic dermatitis sufferers in the general population may not be the optimum manner in which to investigate the relationship between stress and atopic dermatitis. A major reason for this was that the level of stress experienced by the subjects was uncontrolled. In this case, the mean Interpersonal Stress factor score for the atopic dermatitis sufferers was 40.6, while the maximum of 126 was possible. Therefore, the group as a whole reported only moderate levels over the fortnight. While there were obviously subjects who experienced high levels of stress in this period, the true extent of the relationship between stress and atopic dermatitis may be greater than that determined in the previous study. This is because the relationship between stress and exacerbations of atopic dermatitis may not be linear. Also, a critical level of stress may be required in order for sufficient physiological arousal to trigger the required changes in the skin for an attack of the skin disorder. For these reasons, it was decided to examine the relationship between stress and atopic dermatitis symptoms in subjects undergoing a period of naturally occurring stress.

This second experiment also provided an opportunity to examine this relationship from the perspective of Lazarus' (Folkman & Lazarus, 1980; Lazarus & Folkman, 1984) transactional theory of stress and coping outlined in chapter 2. According to this conceptualisation, stress is viewed as a relationship between a person and the environment where the appraisal of the person is that the situation is



relevant to his or her well-being and that their resources to cope with the demands of that situation are exceeded. The critical determinants of stress, therefore, are not the situation, the traits of the person, or their response, but rather the processes of appraisal and coping. As described in chapter 2, appraisal consists of both evaluation of whether an event is relevant or not to a person's well-being, primary appraisal, and what coping resources are available to deal with the event, or secondary appraisal. Coping is defined as those cognitive, emotional, and behavioural efforts to manage environmental and internal demands that occur as a result of changes in the person-environment relationship. Folkman & Lazarus (1980) identified two major forms of coping; that which is problem-focused or directed towards addressing the changing the distressing circumstances, and that which is directed towards management of the emotional and physiological arousal created by the change in the transactional balance. According to the model, it is when these two forms of coping fail to effectively deal with the demands upon the individual that the ongoing physiological arousal may adversely affect health status (Coyne & Holroyd, 1981).

#### *Coping and appraisal*

In recent years, considerable research has been conducted from the transactional perspective. These studies indicate that individuals use both problem-focused and emotion-focused coping strategies in response to most stressors (Folkman & Lazarus, 1980, 1985), but the pattern tended to vary according to the stressor. For example, health-related stressors tended to evoke more emotion-focused coping than work or family stressors (Billings & Moos, 1981; Folkman & Lazarus, 1980). Problem-solving is used more in the workplace (Folkman & Lazarus, 1980). Problem-focused approaches such as planful problem-solving, confrontive coping, and seeking social support are strongly influenced by the situational context, while positive reappraisal tends to be more stable across time and contexts, suggesting it may be influenced by personality factors (Folkman, Lazarus, Gruen, & DeLongis, 1986). Primary and secondary appraisal do not appear to be stable across time or contexts (Folkman, Lazarus, Gruen et al., 1986).

In examining the relationship between appraisal and coping, Folkman, Lazarus, Dunkel-Schetter, DeLongis, and Gruen (1986) found that when situations were appraised as threatening to self-esteem, confrontative coping, self-control coping, increased use of escape-avoidance, and acceptance of responsibility were utilised more, and social support was sought less. When a loved one's well-being was at stake, subjects used more confrontive coping, escape-avoidance, and less planful problem-solving and distancing. Threats to one's physical health were associated with more seeking of social support and escape-avoidance. These results indicated that while there was some specificity with regard to the appraisal of stakes and selection of coping strategies, there were also general trends. With regard to the

relationship between secondary appraisal and coping, subjects tended to accept more responsibility, use more confrontive coping, planful problem-solving, and positive appraisal in situations considered by them to be changeable, and more distancing and escape-avoidance in situations thought to require acceptance. In situations requiring more information, subjects tended to seek more social support, and use more self-control and planful problem-solving. When needing to hold back from doing what they wanted, subjects tended to use confrontive coping, self-control, and escape-avoidance (Folkman, Lazarus, Dunkel-Schetter et al., 1986).

Inconsistent results have been obtained on the issue of sex differences in coping patterns. Folkman and Lazarus (1980) reported no differences between the sexes with regard to the use of emotion-focused coping, but men tended to use more problem-focused coping. This, however, was restricted to the workplace, and those situations appraised as requiring acceptance or a need for further information. Hamilton and Fagot (1986) found a similar lack of differences in college students. On the other hand, Pearlin and Schooler (1978) found women preferred to use selective ignoring, whereas men preferred self-reliance as a strategy. Billings and Moos (1981) found men were less likely to use active-behavioural coping such as finding out more information, as well as less avoidance and emotion-focused coping than women. Vingerhoets and Van Heck (1990) cite the comment by Schilling, Schinke, and Kirkham in their 1985 study on coping strategies of mothers and fathers of handicapped children that the differences may be due to males and females appraising the situation differently. Schilling et al. (1985) state their review of the literature indicates several reasons exist for this difference. First, women have a greater personal investment in successful childrearing. Second, they are more sensitive to troubled children. Third, because of their childbearing role, they feel more responsible for a handicapping condition. Finally, the mother is usually the provider of the extraordinary care required by a handicapped child.

With regard to the differences in appraisal, the available research suggests that fathers had more difficulty accepting a child, often tending to deny the seriousness of the handicap. They also concerned themselves with more instrumental issues while the mothers were more concerned with expressive ones. On the other hand, mothers appraised their situation as providing less freedom and opportunity to develop and having a detrimental effect on mood and health. Despite this, they were more trusting and accepting in their appraisal of the handicapped child (Schilling et al., 1985). As the research by Folkman, Lazarus, Dunkel-Schetter et al. (1986) indicates, appraisal affects coping strategy choice. In the case of the studies reviewed by Schilling et al. (1985) for instance, the mothers found 17 out of 24 coping behaviours more useful than fathers. They opted for a wide range of coping strategies with particular use of

social support while men tended to focus on direct action. This reflects the men's emphasis on instrumental issues and the mothers' emphasis on the expressive issues in their appraisal process.

*Coping and appraisal processes and psychosomatic disorders*

In recent years, studies have investigated the role of coping in the relationship between stressful events and adaptational outcomes such as depression (e.g., Aldwin & Revenson, 1987; Billings & Moos, 1981; Mitchell, Cronkite, & Moos, 1983), and general psychological symptoms (e.g., Folkman, Lazarus, Gruen et al., 1986). Somatic health status has also been subjected to investigation.

Research has been conducted on the relationship between appraisal and coping processes and psychosomatic symptoms. Billing and Moos (1981) examined the impact of negative life events, social resources and coping responses on the occurrence of physical symptoms such as headaches, indigestion, insomnia, and poor appetite over the previous year. A regression equation indicated that negative life events were correlated with occurrence of symptoms; .13 in men and .21 in women. Of the methods of coping assessed, strategies that involved actively avoiding confronting the problem and behaviours that indirectly reduced emotional tension by eating or smoking more were significantly related to occurrence of symptoms in both men and women. Avoidance coping significantly increased the multiple correlation when added after negative life events. For women alone, a more significant relationship existed between physical symptoms and the strategy of active cognitive coping. This involved strategies directed towards the appraisal of the situation such as trying to see the positive side or drawing on past experience. For active cognitive coping, the relationship was negative, the more that women engaged in this strategy the less they experienced the psychosomatic symptoms. For both men and women, the presence of social resources also contributed to the reduction of symptom occurrence, but this effect was stronger for women.

Vingerhoets and Menges (1989) examined the relationships between coping, stressor load, and psychosomatic symptoms. Approximately 1,000 males and females completed measures of everyday problems and life events; a Dutch version of the Ways of Coping Checklist (WCC); and a measure of psychological and psychosomatic complaints, a Dutch version of Derogatis, Lipman, Ricketts, Uhlenhuth, and Covi's (1974) Hopkins Symptom Checklist. The combined score for psychological and psychosomatic symptoms was used in their analyses, which meant it was not a pure analysis of psychosomatic symptoms. Factor analysis of the WCC revealed seven factors: Planned and Rational Actions; Self-blame; Distancing; Daydreaming and Fantasies, Expression of Emotions and Seeking Social Support; Positive Thinking, Personal Growth, Humour; and Wishful Thinking and Emotionality. The subjects were divided into four groups on the basis of scores on the

stressors measures and the symptom measure. The four groups were: low load, low symptoms; low load, high symptoms; high load, low symptoms; and high load, high symptoms. A Load x Symptoms analysis of variance (ANOVA) was conducted. It was found that main effects existed for both load and symptoms. Males and females reporting high levels of symptoms utilised the coping strategies of self-blame, daydreaming and fantasies, and wishful thinking and emotionality. Subjects in the low load group reported less use of distancing. Women in this group also reported less usage of positive thinking, personal growth and humour. No interactions existed, indicating that there was not any particular coping strategies associated with stress resistance or stress vulnerability. This finding was counter to the predictions of Vingerhoets and Menges (1989) as they had thought that the stress resistant group (high load, low symptoms) would have been associated with higher usage of the coping strategy expression of emotions and seeking social support. They concluded that people reporting more psychosomatic symptoms tended to adopt self blame and passive emotion-focused coping strategies. They were not able to say whether this was a cause of the symptoms or a result.

Vingerhoets and Van Heck (1990) also investigated the relationship between coping strategies and psychosomatic symptoms. They provided further analysis of the data from the Vingerhoets and Menges' (1989) study. With the exception of Distancing, significant differences were obtained with regard to their usage by the sexes. Men tended to use more Planning and Rational Actions, Day-dreaming and Fantasising, and Positive Thinking, Personal Growth and Humour. Women tended to use Self-Blame, Expression of Emotions/ Seeking of Social Support, and WishfulThinking/ Emotionality. In terms of Folkman and Lazarus' (1980) dichotomy, men used more problem-focused coping whereas women used more emotion-focused coping. While there was no difference in report of stressors, women reported more symptoms.

Similar correlations were obtained for the sexes in regard to the relationship between the coping strategies and symptoms. Self-blame and Wishful thinking/ Emotionality contributed the most to the explanation of the variance, after stressors were added. Two factors; Planning and Rational Actions; and Positive Thinking, Personal Growth, and Humour; were negatively associated with symptoms, all others were positively associated. This is an important point as it indicated that those strategies that men adopted most were effective in reducing symptoms whereas those adopted by women tended to be positively associated with symptoms. The fact that women report more symptoms may be due to their use of ineffective coping strategies. Stressors entered into a regression analyses predicted approximately 30 % of the variance in symptom scores. The coping strategies contributed 19 % for males and 15 % for females. The strategies of Expression of Emotion/ Seeking Social Support and,

for men only, Distancing did not contribute to the explanation of variance. When coping strategies were entered first, a similar pattern emerged.

Vingerhoets and Van Heck (1990) were also interested in the bidirectionality of the relationship between coping strategies and symptoms. To investigate this, they performed regression analyses where coping strategies were the criterion variables and symptoms and stressors the predictor variables. The results indicated that Self-blame, Daydreams and Fantasies, and especially for males, Wishful Thinking/ Emotionality were predicted by symptoms. This indicated that the occurrence of psychosomatic symptoms did affect the choice of coping strategies.

To explain this bidirectionality, Vingerhoets and Van Heck (1990), draw on the work of Folkman and Lazarus (1988) on feedback loops between emotions and coping. Vingerhoets and Van Heck (1990) suggest that when an individual realizes that a coping strategy is ineffective by the presence of psychosomatic symptoms, they adopt different strategies. They further hypothesise that, distressed people are restricted in their capacity to deal with stressful situations, a point supported by the work of Aldwin and Revenson (1987) who found that depressed people also displayed a bidirectional relationship between coping and symptoms, and that depressed people tended to adopt emotion-focused strategies that increased their symptoms rather than reduced them.

#### *Coping and health status: Potential pathways*

With regard to coping and adaptational outcome in terms of health status, Holroyd and Lazarus (1982) suggest four potential pathways of effect. First, coping may affect the frequency, intensity, and patterning of neuroendocrine stress responses. The effective use of problem-focused coping may lead to stress avoidance or rapid resolution of difficulties, while ineffective use of these strategies might prolong physiological arousal. Emotion-focused coping may moderate stress emotions, or alternately prolong them. Another possibility is that particular coping styles are associated with patterns of physiological arousal that predispose to certain disorders.

A second way in which coping may influence health outcomes is when illness behaviour such as seeking medical treatment, or the physiological symptoms themselves serve as coping functions. An example Holroyd and Lazarus give is that of the effect of illness in psychosomatic families (Minuchin, Rosman, & Baker, cited in Holroyd & Lazarus, 1982). Third, coping may lead to changes in behaviour that affect health status such as eating, smoking and so on. Finally, the way an individual copes with acute or chronic illness may be a determinant of the course of the illness and the treatment received. As shown by Vingerhoets and Van Heck (1990), coping strategies are affected by symptoms.

These pathways depend on stable patterns and appraisals for their effect. In their study of appraisal, coping, and health status, Folkman, Lazarus, Gruen et al. (1986) did not find evidence of stability of appraisal and coping patterns. However, this study was conducted on normals, and it is possible that psychosomatic patients not only cope more ineffectively (Vingerhoets and Van Heck, 1990), they may also be more stable in their appraisal and coping processes than normals. This stability of appraisal and coping, as well as the ineffectiveness of coping strategies selected may be due to a feature of the personality of psychosomatic patients.

In support of this, McCrae and Costa (1986) found that in a sample of normal adults, those who scored high on neuroticism tended to adopt strategies such as hostile reaction, escapist fantasy, self-blame, sedation, withdrawal, wishful thinking, passivity, and indecisiveness. Individuals scoring high on extraversion tended to adopt strategies such as rational action, positive thinking, substitution, and restraint. Those coping strategies utilised by the high neuroticism subjects were also rated by them as more ineffective in solving problems and reducing distress, and were negatively related to self-report of well-being. Therefore, the personality dimension of neuroticism predicted use of poor coping strategies in terms of rated effectiveness and impact on well-being.

#### *Coping, appraisal, and examinations*

Folkman and Lazarus (1985) have applied their cognitive theory of stress and coping to a specific stressful event, college examinations. They were interested in two issues. Firstly, what changes occurred in emotions and coping and use of social support across three stages of the exam process, the anticipatory stage before the exam, the waiting period after the exam but before marks were announced, and the outcome stage. Secondly, they were interested in individual differences in response to the examination at the anticipatory and outcome stages in terms of the extent to which individual differences in emotion could be explained by cognitive appraisal and coping. Although it is the second part of this study that is most relevant to the current study, a review of the entire study is worthwhile.

For the first part of the study, 261 students were involved, 108 of them being assessed at all three stages. They were asked to complete a questionnaire in class on three occasions; two days before a midterm examination (time 1), five days after the examination but two days before the grades were announced (time 2), and five days after the grades were announced (time 3). Data concerning their appraisal of the examination, their emotions, and their coping were collected at each time. With regard to emotional changes across the three stages, Folkman and Lazarus predicted that the emotions consistent with appraisals of threat and challenge would be highest at the anticipatory stage when the examination contents were unknown, and decrease at the outcome stage. Because outcome is unknown at the anticipatory stage, both threat and

challenge emotions should exist. As emotions concerned with appraisals of harm and benefit occur in response to an event, these were predicted to increase in the outcome stage. These predictions were confirmed in their analyses.

With regard to coping across the three stages, 99 % of students used both emotion-focused and problem-focused coping at the anticipatory stage, 95 % used both at the waiting stage, and 94 % used both at the outcome stage. Problem-focused coping, seeking social support, emphasising the positive, and self-isolation decreased significantly from the anticipatory stage to the waiting stage. The first three of these strategies were used the most in the anticipatory stage. The use of distancing increased significantly in the waiting stage, before decreasing along with the use of wishful thinking in the outcome stage.

Social support was important across the three stages; 71 % of students indicated that someone was helpful at time one, 50 % at time two, and 44 % at time three. Informational support, as expected, decreased from the anticipatory stage to the waiting stage, and emotional support increased in the same time. Taken together, these results suggest that emotions, coping and seeking of social support vary across time in a situation, supporting Folkman and Lazarus' (1985) conception of appraisal and coping as a dynamic transaction process.

According to their theory, individual differences in emotion in stressful encounters are due to cognitive appraisal and coping. Situations are regraded as a threat or challenge only if there is something at stake. Viewing a situation as stressful also depends on appraisal of resources. Folkman and Lazarus (1985) predicted that the more the examination was appraised as putting something at stake (e.g., self-respect), the more the emotions of threat and challenge would be aroused. The more the examination was appraised as being difficult, the more threatened the subject would feel. The more in control the person feels, the more challenged the subject would feel. With regard to the outcome, it was predicted that stakes would also be related to the emotions of harm and benefit, because the more someone had at stake, the greater the significance in terms of harm or benefit of the grade received.

Separate regression analyses with each emotion as the predictor variable revealed that they predicted by several of the variables. For example, threat emotions at the anticipatory stage were predicted by wishful thinking, stakes, anticipated difficulty of the examination, and seeking of social support. Challenge emotions at the anticipatory stage were predicted by feeling in control, stakes, problem-focused coping, and reduced use of tension-reduction strategies such as eating and smoking.

#### *The current study*

As stated earlier in the chapter, an aim of this study was to replicate the finding of the previous chapter regarding the relationship between atopic dermatitis and stress. It was decided to examine this relationship in subjects undergoing a period of naturally

occurring stress. In order to accomplish this aim, a known stressor occurring in the lives of the atopic dermatitis sufferers was required. Furthermore, consistency across subjects in the type of stressor was desirable. End of year examinations for university fulfilled these criteria remarkably well; their precise date is known, and there is a period of increasing stress during the study period until the day of the exam. Also, as students sit more than one examination, there is a chance for multiple observations within a short period of time. The suitability of examinations for this purpose was reinforced by the fact that those university students who participated in the previous study had indicated that examinations were often associated with exacerbations of their skin condition.

It was predicted that the atopic dermatitis sufferers would show the same positive relationship between stress and skin symptoms that was found in the previous chapter. It was also predicted that both the day before an examination and the day of the examination would be associated with higher levels of skin symptoms than nonexamination days.

A second aim of the study was to investigate the relationship between examination stress and atopic dermatitis symptoms from the perspective of the appraisal and coping model. Following from Folkman and Lazarus (1986), it was hypothesised that students who perceived an imminent examination as being difficult, uncontrollable, and involving high personal stakes would experience higher levels of threat emotions than challenge emotions. This pattern of appraisal and emotions was also hypothesised to be associated with higher levels of skin symptoms. Based on the work of Vingerhoets and Van Heck (1990), it was hypothesised that the more a student employed the coping strategies of self-blame and wishful thinking, the greater their skin symptoms. Alternatively, use of planful problem-solving and positive reappraisal was predicted to lead to fewer skin symptoms.



## Method

### *Subjects*

Subjects in this experiment were 15 university students, 14 females and 1 male, who suffered from atopic dermatitis. These students were recruited over three years of final examination periods. They were recruited by notices for volunteers in the student daily bulletin, requests to psychology undergraduate classes, and referral by the university doctor. Their mean age was 21.7 years ( $SD = 6.6$ ), and reported that the mean duration of symptoms was 16.0 years ( $SD = 10.9$ ). According to the subjects' responses to the subject information sheet (Appendix B), 13 of the subjects (86 %) believed that stress exacerbated their skin symptoms. Eight of the subjects indicated on the subject information sheet that they believed that examinations were a specific stressful event that exacerbated their symptoms.

### *Measures*

*Diary* The Psychological Diary of Robbins et al. (1974) utilised in the previous study was employed as a measure of interpersonal stress, feelings of depression and isolation, and psychosomatic complaints. As in the previous study, subjects rated the severity of their skin symptoms on a 3-point scale (1 = *a little* ; 2 = *moderately* ; 3 = *severe* ). The diary was the same as that in the previous study, except for three changes. First, subjects were asked to indicate whether or not they had sat an examination on that day. Second, no space was allowed on this version of the diary for elaboration of answers. This was due to a desire to limit time demands on the subjects when completing the diary. Thirdly, subjects were asked to just endorse experienced emotions, rather than rate their intensity. Again, this was to limit demands on the subjects. These last two changes made this version of the diary more closely approximate that utilised by Robbins and Tanck (1982). Reliability and validity information regarding the diary was presented in the materials section of the previous chapter. A copy of this version of the diary is included in Appendix C.

Five subjects participated in the study in the first year. Based on examination of their responses to the diaries and feedback to the experimenter, two fundamental changes were implemented. First, it was decided that the emphasis on interpersonal stress in the Psychological Diary may mean that it was inappropriate for a study focusing on stress induced by nonpersonal sources; that is, studying for an examination. Therefore, it was decided to include another self-report measure of stress.

*Stress and arousal* The self-report measure chosen was the short version of the Stress-Arousal Checklist (SACL) (King, Burrows, & Stanley, 1983), which was based on the longer version developed by Mackay, Cox, Burrows, and Lazzerini (1978). Utilising information concerning the factor loadings of the Mackay et al.

(1978) version, King, Burrows, and Stanley (1983) selected the 20 items that displayed the highest loadings with the stress and arousal scales and which were felt to be the most comprehensible to an Australian population such that their version of the SACL was composed of 10 adjectives that formed each of the two scales. The first, Arousal, measures general levels of activation and is represented by items such as "tired", "active", and "alert". The second scale, Stress, was found to be "associated with perceived threat combined with a diminished belief in one's ability to cope" (King, Burrows, & Stanley, 1983, p. 478). Representative items included "calm", "worried", and "distressed". For both scales, subjects endorse on a four point scale the degree to which each adjective is appropriate to their state at that time.

The items were administered to four groups whom the experimenters believed would differ in terms of their stress and arousal levels. These groups were 42 civilians on a ski holiday, 21 civilian parachutists, 38 male members of the Australian Army, and 25 psychiatric inpatients. The responses of all the subjects were analysed through a principal components factor analysis, using the Scree test criterion, and yielded two factors which were submitted to varimax rotation. The obtained factor loadings were comparable to those obtained in the study by Mackay et al. (1978) (King, Burrows, & Stanley, 1983). Furthermore, a correlation coefficient of  $r = .96$  has been found for the two versions of the stress and arousal scales (King, Stanley, & Burrows, 1987). The internal reliability coefficients for the two 10 item scales were .86 for Stress and .74 for Arousal. These coefficients were confirmed in a later study on changes in patients' Stress and Arousal levels during crisis intervention (Kirk, Stanley, and Brown, 1987). The orthogonality of the two scales was confirmed by a product moment correlation of  $r = .10$ . Hypotheses regarding differences in the levels of stress and arousal between the various subject groups were largely confirmed, as were hypotheses regarding the state changes in the levels of stress and arousal across time in pregnant mothers undergoing childbirth (Wilson-Evered & Stanley, 1986) and patients undergoing crisis intervention work (Kirk et al., 1987), suggesting validity of the scales as measures of these constructs. Therefore, available studies indicate that the scales are of adequate reliability and validity, and sensitive to changes in both states (King, Burrows, & Stanley, 1983; Kirk et al., 1987; Wilson-Evered & Stanley, 1986). The SACL was chosen because of its quick administration time, and the existence of Australian norms (King, Stanley, & Burrows, 1987).

*Appraisal* Assessment of coping and appraisal processes with regard to the examinations was the second change adopted after the first year of the study. This was achieved through the utilisation of the measures described by Folkman and Lazarus (1985). Stakes, or primary appraisal, was measured with the four item scale. Subjects indicated on a 5-point Likert scale (0 = *does not apply* to 4 = *applies a great deal*) the extent to which the following possible reasons for examinations being stressful

applied to them: (a) "not achieving the result (grade) I want"; (b) "appearing incompetent to others"; (c) "jeopardising my view of myself as a capable student"; and (d) "losing the approval or respect of someone important to me". In another study, Folkman, Lazarus, Dunkel-Schetter et al. (1986) utilised a 13 item measure of primary appraisal which was derived from the responses of subjects to open-ended questions in a previous study (Folkman & Lazarus, 1980) as well as a literature review. In the examination study, Folkman and Lazarus (1985) modified six of these items that were appropriate for assessment of stakes involved in examinations. Two of these items were subsequently deleted due to low levels of endorsement. The remaining four item scale displayed good reliability with an alpha coefficient of .78.

Secondary appraisal was assessed by two questions. Difficulty was assessed by the item "How difficult do you think this exam will be?", and Control by "How much in control do you feel now about this exam?" Following Folkman and Lazarus (1985), both questions were answered on a 5-point Likert scale (0 = *not at all* to 4 = *a great deal*). Folkman and Lazarus (1985) do not provide any reliability or validity information regarding these items but they appear to have good face validity. Subjects in this study were not asked for an equivalent of Grade Point Average.

The four emotion scales described by Folkman and Lazarus (1985) were also completed. Subjects indicated on a 5-point Likert scale (0 = *not at all* to 4 = *a great deal*) the extent to which the emotions associated with the appraisal of threat (worried, fearful, and anxious), challenge (confident, hopeful, and eager), harm (angry, sad, disappointed, guilty, and disgusted), and benefit or mastery (exhilarated, pleased, happy, and relieved) applied to them at that point. The scales were scored by summing the ratings for each item. Folkman and Lazarus (1985) state that these four scales were rationally derived. The reliability of the scales was determined by examining the responses of the subjects to the items across the three presentation times: before sitting the examination, after the examination but before grades are known, and after the grades are posted. The mean alpha for the threat emotions was .80, .59 for challenge, .84 for harm, and .78 for benefit. Because of the relatively low reliability of the challenge scale, Folkman and Lazarus suggest that findings with respect to challenge emotions should be interpreted cautiously. The stakes, difficulty, control, and appraisal emotion questions formed an Exam Evaluation Questionnaire which is included in Appendix D.

*Coping* Coping was assessed by the revised version of the Ways of Coping Checklist (WCC) (Lazarus & Folkman, 1984). This is a 67 item revision of the original WCC described by Folkman and Lazarus (1980). The items in the checklist were drawn in part from previous research on coping and partially from Lazarus' own theoretical framework. The major changes to the revised version of the scale are the alteration of the *yes-no* format to a 4-point Likert scale (0 = *not used* to 3 = *used a*

*great deal* ), and the deletion, or rewording of items in the original version, and the addition of new items suggested by subjects in previous studies (Folkman, Lazarus, Dunkel-Schetter et al., 1986). Information regarding the reliability of the checklist factors will be presented later.

#### *Procedure*

Subjects were informed that the purpose of the current study was to evaluate the relationship between a specific stressful event, university examinations, and the symptoms of their skin disorder. Subjects were not informed as to the specific hypotheses under investigation in the current study. The purpose and hypotheses of the study were not discussed in any more detail, and questions by the subject were deferred by the experimenter until after the study was completed. All subjects completed the Psychological diary each night before retiring. They completed the diary for the period from the beginning of the pre-examination period study week until the night of their last examination. The ten subjects who participated in the second and third years of the study also completed the SACL each night for the same period. These ten subjects also completed the Exam Evaluation Questionnaire and the WCC on the night before each of their examinations. At the commencement of the study, the experimenter and the subject marked those days on the diary sheets that corresponded to the night before an examination so that the subjects were reminded to complete the questionnaires. The questionnaires were numbered to correspond to the number of the examination; that is, the night before the first examination, the subject completed Exam Evaluation Questionnaire 1 and the WCC which was attached. Subjects were not contacted during the course of the study in order to remind them to complete the diaries and questionnaires. The subjects were asked to return the questionnaires and diaries to the experimenter after their final examination. Those subjects who did not return them one week after their final examination were contacted by letter and reminded to return them. None of the subjects failed to return the diaries and questionnaires, giving a compliance rate of 100 %. Subjects were paid \$25 for their participation upon the return of the materials.

## Results

One female subject provided incomplete diary data; less than 50 % of the days were completed; and was, therefore, excluded from the analysis. Another subject's data indicated no relationship ( $r = .04$ ) between the stress scales of the Psychological Diary and the SACL. As the other eight subjects who completed the diary and the SACL showed a mean correlation between the two stress scales of  $r = .42$  ( $SD = .23$ ) (see Table 3), this suggested that she had not completed the forms in a consistent manner. Therefore, she was excluded from the study. This left a total of 13 subjects (87 % of original sample) who completed the diary; a subset of 8 of these 13 subjects (53 % of original sample, 62 % of remaining subjects) also completed the SACL each day, and the Exam Evaluation Questionnaire and WCC on the eve of each examination.

### *Relationship between stress and skin symptoms*

As in the previous study, each subject was treated as a separate test of the hypothesis that there is a relationship between stress and exacerbation of symptoms of atopic dermatitis. As stated in the previous chapter, this approach was adopted because the literature review in chapter 1 indicated that atopic dermatitis is a disorder with multifactorial determinants. Although stress is considered by the three psychobiological conceptualisations to be a major determinant of exacerbations, it is not the only one. Given this, it is probable that the relative importance of stress as a determinant varies across individuals as well as across separate exacerbations within an individual. Therefore, the initial analyses were concerned with the strength of the relationship for each individual rather than the overall strength of the group as a whole.

The diaries, Stress-Arousal Checklist, and all the questionnaires were scored by hand by the experimenter. To ensure that the experimenter was blind to the identity of subjects, each individual's material was identified only by an assigned number. One of the aims of the current study was to replicate the previous study's findings regarding the relationship between stress and skin symptoms. Therefore, the first set of analyses conducted were similar to those conducted in the previous chapter. For each subject, the score for the factor Interpersonal Stress of the Psychological diary was determined by summing the number of items in the factor endorsed for each day. The symptom score was the rating of the skin condition by the subject for each day (0 = no symptoms reported; 4 = symptoms rated as severe). Utilising each day's pair of Interpersonal Stress- skin symptom scores, a correlation coefficient was obtained for each subject. Similar correlation coefficients were obtained for each subject for the relationship between the Depression- Isolation factor of the Psychological Diary and the skin symptom scores. It was also of interest to examine the relationship between skin symptoms and the second measure of stress; that contained in the SACL; in order

to compare the findings with those obtained by the Interpersonal Stress factor. Furthermore, the relationship between the Arousal scale of the SACL and skin symptoms was investigated in order to examine whether levels of arousal were related to skin symptoms. The Stress and Arousal scales of the SACL were scored according to King et al. (1987). Correlation coefficients for the relationship between SACL Stress- skin symptoms and Arousal- skin symptoms were obtained in a similar manner to that described above. The correlation coefficients of these relationships are shown in Table 3 for the 13 subjects who completed the diary and for the 8 who completed the SACL.

Table 3 shows that for the relationship between the Interpersonal-Stress factor of the Psychological Diary and skin symptoms was nonexistent for seven of the subjects, positive for five, and negative for one. Two of the subjects (9, 13) displayed a significant relationship. The relationship between the Depression-Isolation factor of the diary and skin symptoms was more variable, with four negative and seven positive relationships among subjects. One (4) was significantly positive, and two (7, 9) were close to significant. For the SACL- Stress scale and skin symptoms relationship, only one was negative and six were positive. Two (8, 9) had significant relationships, and one (11) was close to significant. The relationship between SACL- Arousal and skin symptoms tended to be negative; for one subject (10), the relationship was significantly negative. This indicated that arousal by itself was not related to skin symptoms. Most subjects displayed positive relationships for the two measures of stress as well as the two factors of the diary.

Four subjects showed a significant or nearly significant positive relationship between stress and skin symptoms. The overall pattern of correlations between skin symptoms and Interpersonal Stress, SACL- Stress, Depression-Isolation, and SACL- Arousal, was examined through the use of meta-analyses. This analysis was conducted to provide a comparison with the results obtained in the previous study. The use of meta-analysis made it possible to determine whether the distribution of correlations obtained by the subjects was significantly different than that expected by chance. As explained in chapter 2, meta-analysis is a means of evaluating the overall significance of a series of independent studies; an approach consistent with the current study's conceptualisation of each individual subject as a separate independent study. As in chapter 2, the meta-analytic method chosen was the unweighted Stouffer method (Rosenthal, 1978). The results of the meta-analyses are shown in Table 4.

The pattern of relationships between skin symptoms and Interpersonal Stress, SACL- Stress and Depression- Isolation were all significantly different from that expected by chance. This was particularly true of the relationship between skin symptoms and SACL- Stress. Therefore, the hypothesis regarding the existence of a positive relationip between stress and atopic dermatitis symptoms was confirmed, replicating the findings of the previous study.

Table 3  
*Correlation Coefficients for the Relationships Between Factors of the Psychological Diary, the Stress-Arousal Checklist, and Skin Symptoms*

		Relationship					
Sub. No.	No. of Days	IS-Skin	Dep.-Skin	IS-Dep.	Strs-Skin	A.-Skin	IS-Strs
1	31	.26	.20	.54	—	—	—
2	39	-.05	.01	.52	—	—	—
3	42	.08	-.18	.24	—	—	—
4	29	.01	.35	.33	—	—	—
5	35	.08	.11	.23	—	—	—
6	14	.17	.14	.71	-.11	-.03	.21
7	28	.10	.30	.35	.00	-.19	.23
8	32	.04	-.12	.47	.35	.17	.60
9	13	.58	.51	.53	.64	-.15	.78
10	25	.13	.14	.19	.44	-.37	.46
11	26	.05	-.13	.60	.38	-.12	.59
12	8	-.21	-.52	.79	.34	.30	.16
13	15	.51	.35	.73	.18	.02	.30

*Note.* IS = Interpersonal Stress, Dep.= Depression-Isolation, Skin = Skin Condition, Strs = SACL- Stress, A. = SACL- Arousal.

Table 4  
*Summary of Meta-analyses Relating Skin Condition to the Measures of Stress, Depression, and Arousal*

Factor	<i>n</i>	<i>Z</i>	<i>p</i> (one-tailed)
Interpersonal Stress	13	2.2161	.0132
Depression-Isolation	13	1.7029	.0446
SACL- Stress	8	3.3234	.0005
SACL- Arousal	8	.39597	.3440



### *Relationship between examinations and skin symptoms*

An implicit assumption of the current study is that the day of examinations and the day before an examination; for simplicity's sake referred to as "exam days", were more stressful than those days without examination; the "nonexam days". This assumption was investigated by statistical methods. The group means of the subjects' mean scores on the two measures of stress were mostly higher on the day before an examination and on examination days compared to nonexamination days; 3.52 (SD = 1.55) compared to 3.04 (SD = .847) for Interpersonal Stress, and 4.11 (SD = 1.15) compared to 3.65 (SD = .97) for SACL- Stress. When analysed by *t* tests, the differences were not significant for Interpersonal Stress, and approaching significance for SACL- Stress [*t* (12) = 1.49, *p* > .10 and *t* (7) = 2.04, *p* = .08, respectively]. Therefore, the evidence supporting this assumption was limited.

It was predicted that the day of an examination, and the day before an examination, the exam days, were associated with higher levels of skin symptoms than those days without examinations, nonexam days. The results of the twelve subjects who had sat more than one examination (Mean number of exams sat = 4.8, SD = 1.5) were analysed. For the sake of continuity of the conceptualisation of each subject as a separate test, each subject's data was analysed separately. This approach meant that a subject's skin symptoms on exam days could be compared with his own mean level of skin symptoms over the entire examination period. The mean level of skin symptoms for the entire examination period for each subject was determined. Skin symptom scores above this mean were regarded as "high" skin symptom days for that particular subject, scores below were designated "low" skin symptom days. Each day was also categorised as exam day (as defined above) or nonexam day. Due to the small number of examinations sat by each subject, results were analysed by Fisher's Exact Test (Siegel, 1956). The *p* -values obtained for each subject are shown in Table 5.

Of the twelve subjects, four showed a significant pattern of higher skin symptoms on exam days and lower skin symptoms on nonexam days. This pattern was close to significant for a further two subjects. As indicated in Table 5, only one subject showed the reverse pattern of results.

### *Appraisal, coping and examinations*

One of the aims of the current study was to investigate the relationship between stress and skin symptoms utilising the transactional approach of Lazarus. As a first step in that analysis, it was of interest to examine whether subjects in the current study appraised and coped with examinations in a similar manner to the subjects of Folkman and Lazarus (1985). Eight of the subjects completed the appraisal and coping questionnaires the night before each of their examinations. Each student sat a mean of 3.88 examinations (SD = 1.83). The primary appraisal (stakes), secondary appraisal

Table 5

*Individual Subject's Fisher's Exact Test p- values for the Association Between Examination Days and Increased Skin Symptoms*

Subject No.	p - value
1	.063
2	.009
3	.008
4	.031
5	.472 <sup>a</sup>
6	.176
7	.591
8	.486
9	.315
10	.012
11	.061
13 <sup>b</sup>	.549

<sup>a</sup>Pattern of results were in the opposite direction predicted. <sup>b</sup>Subject 12 sat one examination only and was therefore not included in analysis.

(difficulty and control), and appraisal emotion scales (threat, challenge, harm, benefit) were scored according to Folkman and Lazarus (1985). Stakes was the sum of scores for the four items, difficulty and control were the scores for the respective single items, and the scores for threat, challenge, harm and benefit were the sum of scores for each scales' respective emotions.

The number of subjects and responses were too low to allow a factor analysis of the WCC to determine factors. Folkman and Lazarus (1985) did not provide full details of the item content of the factors, only example items. Therefore, the eight factors described by Folkman, Lazarus, Dunkel-Schetter et al. (1986) were employed. These were chosen for two reasons; first, they have been used by the Lazarus group on more than one occasion (e.g., Folkman & Lazarus, 1988), suggesting their stability; and second, many factors were similar in item content to those employed by Folkman and Lazarus (1985), allowing for comparison of findings. Folkman, Lazarus, Dunkel-Schetter et al. (1986) interviewed 85 couples at monthly intervals for five months regarding the most stressful encounter they had experienced during the week prior to the interview. As part of the interview, they completed the WCC. Their responses to the items of the WCC were analysed using alpha and principal factoring with oblique rotation. Three separate factor analyses were conducted. The first utilised all 750 observations obtained from subjects. Second, one stressful encounter was selected randomly for each subject such that all five time points were equally represented. Third, an additional sample of 150 stressful encounters were selected from the remaining pool of encounters, again equally representing each of the five time points. The three analyses yielded very similar factor patterns. Of the 67 items, 37 consistently loaded highly on the same factor. A further 22 items loaded on the same factor relatively consistently. Of these latter items, eight were eliminated because of their marginal factor loadings or lack of conceptual link with their factor. The seven items which did not load consistently on any factor were eliminated. The remaining 57 items were subjected to a final principal factor analysis across all the 750 observations in order to determine an estimate of each item's factor loading. Eight factors were extracted in the analysis: Confrontive Coping, Distancing, Self-controlling, Seeking Social Support, Accepting Responsibility, Escape-avoidance, Planful Problem-solving, and Positive Reappraisal. The factors had a mean alpha coefficient of .70 ( $SD = .06$ ). Item correlations with the factors were largely appropriate. Item content of the Folkman, Lazarus, Dunkel-Schetter et al. (1986) factors, the alpha coefficients for the factors, and the factor loadings of constituent items are included in Appendix E.

The subjects in the current study rated the examinations as being of moderate levels with regard to stakes ( $M = 7.7$ ,  $SD = 4.6$ ), difficulty ( $M = 3.5$ ,  $SD = 1.2$ ), and their level of control ( $M = 1.9$ ,  $SD = 1.0$ ). With regard to the appraisal emotions,

the atopic dermatitis sufferers reported similar levels of threat ( $M = 5.5$ ,  $SD = 3.4$ ) and challenge ( $M = 4.9$ ,  $SD = 2.6$ ) emotions to the subjects in Folkman and Lazarus (1985) but less harm ( $M = 1.6$ ,  $SD = 3.0$ ) and higher benefit ( $M = 3.5$ ,  $SD = 3.3$ ) emotions.

Scores on each of the factors (Confrontive Coping, Distancing, Self-controlling, Seeking Social Support, Accepting Responsibility, Escape-avoidance, Planful Problem-solving, and Positive Reappraisal) were obtained for each completed WCC by summing the scores of items in these factors. The means and standard deviations are shown in Table 6. The comparable factors from Folkman and Lazarus (1985) and their means for the anticipatory phase of the examination period (before the examination) are also displayed in Table 6. Only six factors could be matched. Two of the factors identified by Folkman and Lazarus (1985); Tension-reduction and Self-isolation; could not be matched with the factors identified by Folkman, Lazarus, Dunkel-Schetter et al. (1986). However, the strategies covered by these two factors were the least utilised by their subjects during the anticipatory phase. Likewise, two of Folkman, Lazarus, Dunkel-Schetter et al.'s (1986) factors; Confrontive Coping and Self-controlling; did not have matches with those identified by Folkman and Lazarus (1985). As can be seen from Table 6, Confrontive Coping was utilised the second least by subjects in the current study, while Self-controlling was the second most utilised set of strategies.

Despite these limitations, it is possible to compare usage of coping strategies by subjects in the current study with those employed by the subjects of Folkman and Lazarus (1985). Both samples use Planful problem-solving the most frequently, and Escape-avoidance (Wishful Thinking in Folkman and Lazarus) the third most frequently. Both used Distancing moderately, and Accepting Responsibility (Self-blame) relatively little. Two main differences existed between the samples. Seeking Social Support was the second most frequently used strategy of the Folkman and Lazarus subjects, but the fifth by the atopic dermatitis sufferers. Positive Reappraisal was used fourth most frequently by the Folkman and Lazarus sample but sixth by the atopic dermatitis sufferers. Therefore, the atopic dermatitis sufferers tended to seek less social support, and be less likely to emphasise the positive side of the situation.

#### *Appraisal, coping, and skin symptoms*

The relationship between appraisal and coping processes and skin symptoms was also examined. This analysis was conducted in order to determine whether the conceptualisation of stress in terms of appraisal and coping processes was able to predict skin symptoms. As indicated in the introduction to this chapter, previous research by Vingerhoets and associates (Vingerhoets & Menges, 1989; Vingerhoets & Van Heck, 1990) found that use of coping strategies such as wishful thinking and

Table 6

*Means and Standard Deviations Scores for Each of the Factors of the Ways of Coping Checklist and Comparable Factor Means From Folkman and Lazarus (1985) (n = 8)*

Factor	No. of items	Mean	SD	Comparable Folkman & Lazarus Factor	Mean
Confrontive Coping	6	2.7	2.2		
Distancing	6	4.4	2.9	Distancing	3.5
Self-controlling	7	6.3	3.9		
Seeking Social Support	6	4.2	3.3	Seeking Social Support	7.0
Accepting Responsibility	4	2.3	2.1	Self-blame	3.3
Escape-avoidance	8	5.7	2.9	Wishful Thinking	5.2
Planful Problem-solving	6	8.1	3.4	Problem-focused	15.2
Positive Reappraisal	7	3.8	3.9	Emphasising the Positive	4.2

emotionality and self-blame were associated with increased psychosomatic symptoms, while planning and rational action and positive thinking, humour and personal growth related strategies were negatively associated with psychosomatic symptoms. Therefore, it was of interest to determine whether a similar pattern was found for the relationship between coping strategies and skin symptoms in the subjects of the current study. However, low numbers of subjects and the dependence in the data created by multiple examinations reported by the subjects restricted this aspect of the study to an exploratory nature only.

Dependence in the data was controlled by residualised scores as suggested by Folkman and Lazarus (1988). Each subject's within-person mean on the variables (stakes, difficulty, control, emotions, and the coping strategies) was partialled out by entering it before the raw scores for the variable in the stepwise regression analysis. Dependency within the criterion variable, skin condition, was controlled in two ways. In the first series of stepwise analyses, the skin condition for each examination day was subtracted from the within-person mean skin condition and the difference score entered as the criterion variable. In the second series of analyses, the subject's within-person mean skin condition was entered as a predictor variable in the first step, followed by the within-person mean for the variables in question, and finally, the raw scores for the variables. The raw skin condition score was the criterion variable in this set of analyses. The mean scores for the eight subjects on skin symptoms, the three appraisal questions (stakes, difficulty, control), the four emotions scales, and the eight factors of the Ways of Coping Checklist are shown in Table 7 and the raw data for these analyses are shown in Appendix F.

Two separate analyses were conducted. The first utilised the appraisal items concerning stakes, difficulty, and control and the eight coping factors to predict skin symptoms. The second utilised the four emotions scales to predict skin symptoms. Both sets of analyses were conducted utilising the two methods of controlling for dependency in the data described above. The two methods yielded essentially the same results for both of the separate analyses. None of the raw scores for the predictor variables added significantly to the prediction of the skin condition, once the within-person means for the variables had been partialled out. For the analyses conducted on the emotions scales, the mean scores for the emotions scales which were forced into the regression equation accounted for 46 % and 30 % of the variance, depending on the analysis [raw skin scores as predictor variable final step:  $r = .68$ ,  $r^2 = .46$ ,  $F(5, 25) = 4.2$ ,  $p < .01$ ; difference from mean skin scores as predictor variable final step:  $r = .55$ ,  $r^2 = .3$ ,  $F(4, 26) = 2.8$ ,  $p < .05$ ].

With regard to the stepwise regressions involving the appraisal questions and coping factors, the analysis utilising raw skin scores as the criterion variable accounted for 63 % of the variance once the mean scores of the predictor variables had

Table 7

*Subjects' Number of Examinations, and Mean Scores on Skin Symptoms, Appraisal Questions, the Four Emotions Scales, and the Eight Factors of the Ways of Coping Checklist (n = 8)*

Sub. No.	No. of Exams	MSkin	MStakes	MDiff.	MCont.	MThrt.	MChall	MHarm	MBen
6	2	1.500	8.00	3.00	1.50	4.00	4.00	0.00	3.00
7	4	1.75	10.5	4.00	1.75	8.75	4.50	1.25	.25
8	4	1.500	9.25	4.00	1.50	7.25	3.25	3.50	3.75
9	7	2.00	11.00	3.85	2.00	6.28	5.28	1.28	5.28
10	4	2.66	6.25	2.75	2.50	3.00	8.25	4.00	5.50
11	5	2.00	2.20	3.00	2.00	3.60	3.40	.20	1.20
12	1	1.00	7.00	2.00	2.00	6.00	7.00	1.00	8.00
13	4	2.50	5.50	3.50	1.75	6.75	5.00	.75	3.00
Sub. No.		MW1	MW2	MW3	MW4	MW5	MW6	MW7	MW8
6		3.50	4.00	7.00	4.00	1.50	1.00	8.00	10.50
7		1.50	1.50	3.25	6.75	2.50	3.50	5.00	1.00
8		2.50	5.50	9.00	2.75	3.50	8.00	7.75	1.75
9		4.71	7.00	8.00	4.29	1.14	6.30	10.71	5.57
10		4.75	10.00	12.25	2.50	5.75	8.75	10.50	9.50
11		.40	1.40	1.00	.20	.60	3.20	4.40	.00
12		.00	2.00	2.00	10.00	1.00	2.00	3.00	5.00
13		2.00	2.75	5.75	7.50	4.00	7.75	10.75	2.00

*Note.* Sub. No.= Subject Number, No. of Exams = Number of Examinations, MSkin = Mean Skin Symptoms score, MStakes = mean score on Stakes questions, MDiff. = mean score on Difficulty question, MCont. = mean score on Control question, MThrt = mean score on Threat Emotions, MChall. = mean score on Challenge Emotions, MHarm = mean score on Harm Emotions, MBen = mean score on Benefit Emotions, MW1- MW8 = mean score on the eight Ways of Coping Checklist factors (Confrontive Coping, Distancing, Self-controlling, Seeking Social Support, Accepting Responsibility, Escape-avoidance, Planful Problem-solving, Positive Reappraisal) respectively.

been forced into the equation [ $r = .79, r^2 = .63, F(12, 18) = 2.5, p < .05$ ]. When the difference from the subject's mean skin score was the criterion variable, the mean scores on the appraisal and coping variables accounted for 53 % of the variance [ $r = .72, r^2 = .53, F(11, 19) = 1.9, p > .05$ ]. The final steps of each of these analyses are included in Appendix G.

In order to determine if any of the appraisal questions or coping factors showed a relationship with skin symptoms, the correlation matrix of all the variables; emotion scales, appraisal questions, factors of the coping scale, and raw skin scores; was examined (see Appendix H). Only two of the coping factors, Confrontive Coping ( $r = .37$ ) and Planful Problem-solving ( $r = .43$ ) showed a relationship with skin symptoms.



### Discussion

This study provides further support for the relationship between self-report of stress and increases in skin condition. Both the Psychological Diary's Interpersonal Stress factor and the SACL- Stress factor were found to be positively associated with increases in skin symptoms over the examination period. Although this relationship was significant for only 3 of the 13 subjects, the low number of data points for each subject raises the level of correlation necessary for significance. The finding of significant positive relationships in three of the cases (23 %) is consistent with the findings of the diary study reported in the previous chapter where 12 of 49 subjects (24 %) showed a positive significant relationship.

The results of the meta-analyses for the correlations between skin symptoms and Interpersonal Stress and SACL- Stress indicated that both displayed patterns significantly more positive than that expected by chance. The lower positive associations between Interpersonal Stress and skin condition shown in Table 3 confirms the belief that the factor's emphasis on stress created by having to assert oneself in interpersonal situations (Robbins et al., 1974) was inappropriate for a study on examination stress. Examinations are primarily a solitary process; the student most often studies alone, and stress is a consequence of such factors as time pressures, difficulties in understanding and learning material, and uncertainty regarding the content of the examination. Consequently, the SACL- Stress factor, which is non-specific with regard to the source of the stress was more suited to the purposes of the current study. This was reflected in the fact that the relationship between the two measures of stress varied from weak to high across the eight subjects who completed both measures. The level of significance for the SACL- Stress meta-analysis was of the same order of magnitude to those reported in the previous chapter for the Interpersonal Stress factor and skin condition.

Further evidence for the relationship between examination stress and increases in skin symptoms was obtained in the analysis of skin condition scores on exam and nonexam days. Exam days displayed a trend towards higher scores on SACL- Stress, scoring approximately 41 % of maximum stress levels on these days compared to 36 % on nonexam days. The results for Interpersonal Stress revealed a similar difference in levels of stress on exam and nonexam days, though again this was nonsignificant. Examination of each individual subject's relationship between increased skin symptoms and exam days revealed that four had a significant positive association and two were very close to significant. Only one subject's relationship was in the direction opposite to that predicted.

Despite the significant relationship between stress and skin symptoms displayed by three of the subjects and the significance of the meta-analyses of the correlations, it is possible to ask why many subjects demonstrated no relationship or why in those subjects who did, the relationship is not stronger. There are several potential reasons. First, as explained in chapter 2, atopic dermatitis is a multi-determined disorder; psychological factors account for only one possible reason for fluctuations in the skin condition. It is possible that exacerbations due to allergic or climatic factors occurring on days of lower stress resulted in a decrement of the obtained correlations between stress and skin symptoms. Secondly, methodological reasons may account for the low number of subjects reporting a significant relationship. The subjects who reported stress on both measures reported a higher mean relationship for SACL- Stress than Interpersonal Stress ( $M = .14$  and  $M = .28$ , respectively). As stated above, the correlation between the two measures of stress was varied between weak and high with a mean of  $r = .42$ . If all the subjects had completed the SACL each night, it is possible that the number of subjects with significant positive relationships would have been greater. Another methodological consideration regarding the low relationship between stress and skin concerns the reliability of the subjects' self-report of skin condition. As stated in chapter 2, the approach was adopted for convenience and the fact that some elements of the condition such as soreness and itchiness can only be reliably rated by the sufferer. However, the use of objective indications such as amount of corticosteroid creams or antihistamines used may have provided a more reliable indication of skin condition.

The fact that subjects reported only moderate levels of stress even on days of examinations and that the difference in stress levels on exam versus nonexam days was not significant may also account for the low number of subjects who displayed a significant positive relationship. This is consistent with the fact that subjects rated the examinations as being of only moderate difficulty, as having only moderate levels of stake involved and being moderately in control. Similarly, they rated themselves as only moderately threatened and challenged by the examinations. If subjects had been experiencing higher levels of stress rather than moderately stressed throughout the entire period, then a stronger relationship between stress and skin symptoms may have been found. Alternatively, it may have been more appropriate to compare the period before or after the examination period and the period during the examinations.

The role of appraisal and coping processes in the relationship between skin symptoms and examination stress was investigated in this study in a limited exploratory manner. This is due to the low numbers of subjects participating in this part of the study, and the dependency in the data due to subjects completing the questionnaires for each time they sat an examination. Therefore, it was not possible to examine whether consideration of appraisal and coping responses led to the demonstration of a stronger relationship between stress and skin symptoms. Despite these limitations, the subjects in the current

study reported similar results as the subjects of Folkman and Lazarus (1985). They responded to the examinations with similar degrees of threat and challenge emotions, while the subjects in the current study saw their upcoming examination as slightly less harmful and slightly more beneficial than those in the Folkman and Lazarus study. In both studies, planful problem-solving approaches was used most frequently; strategies involving escape-avoidance or wishful thinking were used the third most frequently by both groups; distancing was used moderately; and accepting responsibility or self-blame was used very little by either group. The major differences between the groups lay in the atopic dermatitis sufferers seeking social support much less and in their reduced use of positive reappraisal. Whether this reduced use of social support reflects the atopic dermatitis sufferers appraising social support as less available or less effective is unknown. If a similar finding was obtained in a study with larger numbers of subjects, it may be an issue worth investigation.

The prediction of skin symptoms by appraisal and coping processes was also investigated using the data from the 31 sets of examination questionnaires completed by eight subjects. Dependency in the data was controlled for by following the method described by Folkman and Lazarus (1988). This allowed each set of questionnaires to be treated as a separate observation. After partialing out the influence of within-person means, none of the variables added significantly to the prediction of skin symptoms. Given the low number of subjects from which the data was collected, this is not surprising. Two of the coping scales tended towards being associated with more symptoms. These were: Planful Problem-solving, deliberate problem-focused efforts to solve the situation; and Confrontive Coping, or aggressive efforts to change the situation that may involve hostility or risk-taking (Folkman, Lazarus, Dunkel-Schetter et al., 1986). It is interesting to note that active problem-solving was the most utilised strategy yet was associated with increased symptoms. Confrontive Coping was one of the least used strategies yet was also associated with increased symptoms. However, these results are based on such small numbers and were not of sufficient magnitude to enter into the regression equations in the prediction of skin symptoms. Therefore, no weight should be placed on the relationships and the hypotheses made with regard to these relationships cannot be adequately tested. Obviously, a larger study with greater subject numbers would be necessary in order to investigate this issue properly.

The view that these results cannot be given any weight is supported by the comparison of the current study with those of Vingerhoets and Van Heck (1990). The current results are inconsistent with the findings of Vingerhoets and Van Heck (1990) that factors involving planful problem-solving and positive thinking were negatively associated with psychosomatic symptoms, and those involving self-blame and wishful thinking showed a positive relationship to symptoms.

In summary, then, this study provides further support that stress is associated with increases in atopic dermatitis symptoms. However, due to low subject numbers the study was not able to adequately investigate the relationship between coping and appraisal processes and skin symptoms. Further investigations with larger subject numbers are necessary to examine this issue.

**CHAPTER 4**  
**PERSONALITY AND ATOPIC DERMATTIS:**  
**A LITERATURE REVIEW AND META-ANALYTIC REVIEW.**

### *History of personality research in atopic dermatitis*

There is a long history of those who have speculated on the role of psychological factors on the skin and on skin disorders, beginning in the late eighteenth century. Starting with the observation that short-term emotional reactions, such as embarrassment or fear, had an effect on the skin these early investigators sought to delineate the connection between specific emotional or psychological states and the causation of skin disorders. Their statements were based on clinical observations, rather than experimentation, and ascribed to psychological factors a sole aetiological role in the absence of proposed pathways of action. These early references have been reviewed in detail by Flanders Dunbar (1954) and Whitlock (1976); the latter author providing a critical overview of the history of such thought.

Evolving initially out of German, and from the mid-1920s onwards, American psychoanalytic writings, unconscious emotional conflicts and personality constellations were advanced as the causes of psychosomatic disorders. In subsequent years, considerable research was dedicated to the delineation of specific conflicts or personality profiles for each disorder. This was particularly true with regard to skin disorders such as atopic dermatitis. In reviewing the research on personality and atopic dermatitis conducted since 1940, Whitlock (1976) states that the majority can be divided into four broad categories: those studies that employed psychodynamic and psychoanalytic approaches; those that investigated the role of maternal rejection during infancy; those studies that sought to find a specific personality profile; and those studies that employed psychometric tests to investigate personality structure.

#### *Psychodynamic studies*

Although not the first writer to consider psychosomatic disorders from a psychodynamic perspective, the most influential was Franz Alexander. Alexander's (1950) specificity theory stems from the normal bodily reactions to emotion such as increases in blood pressure. Alexander believed that if the emotional arousal was chronic due to unresolved conflicts, the physiological response would also be chronic. This sympathetic and parasympathetic nervous system hyperactivity would lead to specific disease states.

According to Alexander, the basic emotion that caused sympathetic activity was aggression, while parasympathetic activity was associated with dependency. These terms were very broad but specific patterns of emotional response were thought to exist for the specific physiological disorders. Alexander and his co-workers used clinical observation and psychoanalysis to develop characteristic patterns of unresolved psychological conflicts and the associated chronic suppressed affect which led to the development of seven diseases which became known as the classic psychosomatic disorders: bronchial asthma, arthritis, ulcerative colitis, essential hypertension, peptic ulcer, neurodermatitis, and thyroiditis. For example, the

sufferers of ulcers were described as having an unconscious wish to be cared for, which due to shame is repressed in favour of excessive independence. Although each disorder had its own specific constellation, Alexander felt that all sufferers of psychosomatic illnesses shared an underlying psychological dependency in relationships. For sufferers of neurodermatitis, this conflict consisted of a desire to receive physical affection from others through exhibitionism of the skin. However, these sexual impulses led to guilt feelings that were displayed in a masochistic manner by scratching of the skin (Alexander, 1950).

Other writers of a psychodynamic perspective chose to emphasise other features. Musaph (1969) placed great importance on the role of aggressive impulses. According to his theory, symptom formation occurred when an aggressive impulse was warded off and the energy discharged through organic pathways. The itching sensation was seen as a method of handling the intrapsychic conflict between the Id, ego, and the super-ego. Unconscious, unresolved conflicts from infancy were expressed through physiological changes to circulation and secretion patterns in the skin that lead to the itch sensation. In support of his theory, Musaph drew from animal and human studies of derived activities to demonstrate scratching behaviour in response to frustration. Other authors (e.g., Pillsbury, 1953) had commented on the tendency for neurodermatitis sufferers to scratch when hostile feelings were raised, though Jordan and Whitlock (1972) have explained such behaviour in terms of conditioned responses, and more recently, Gil et al. (1988) found that parental responses to scratching were important predictors of scratching behaviour. Musaph (1976) saw the atopic dermatitis sufferers' habit of scratching to the point of slight pain as giving them a pleasure that could be seen as equivalent to masturbation, or a form of skin eroticism.

#### *Criticisms of the psychodynamic approach*

The psychodynamic approach was abandoned for several reasons. First, investigators were unable to agree on the emotional and personality features present in atopic dermatitis sufferers. Second, as Rostenberg (1959) points out, other investigators who attempted to replicate Alexander's (1950) specificity of conflict constellations failed to find supporting evidence. Third, these studies occurred at a time that the psychodynamic approach was coming under attack for its lack of an empirical basis by proponents of behaviourism. In this regard, the studies failed to provide explanations of the pathways by which these emotional conflicts were thought to act upon the skin. Those that did (e.g., Alexander, 1950) failed to demonstrate that physiological changes observed in the laboratory led to sustained pathological states (Dorian & Taylor, 1987).

### *Maternal rejection*

As early as 1937, Rogerson stated that overanxious, overprotective parents were responsible for the precipitation or aggravation of atopic reactions in children. Miller and Baruch (1948) compared 63 children with atopic disorders with 37 non-allergic children and observed evidence of maternal rejection in 62 of the atopic cases and 9 of the controls. As the observations were not conducted by independent raters, the validity of such a claim must be questioned. Arguing against the possibility that this maternal rejection is a result of the allergic illness, Miller and Baruch (1950) state that the rejection precedes the onset of allergic symptoms in a significant number of cases. The basis of this conclusion is not stated but if based on interviews with the mother is possibly subject to distortions of memory and interviewer bias.

Spitz (1951) in a study of infants with neurodermatitis concluded it was due to maternal hostility hidden by a facade of anxiety. Williams (1951) found in his study of 53 cases of children with atopic dermatitis that when the experimental group of mothers were given advice and counselling to manage their rejection of their children, the children had a more favourable therapeutic response at 24 months follow-up than the children who received the standard dermatological treatment. As Whitlock (1976) points out, the difference between the groups is small; 30 out of 33 cases in the experimental group compared to 16 out of the 20 control subjects; and that other factors were not considered as possible reasons for the reported difference.

Marmor, Ashley, Tabachnick, Storkan and McDonald (1956) interviewed 22 mothers of children aged 6 months to 11 years with neurodermatitis referred at random by dermatologists. The mothers were questioned with regard to the circumstances and emotional climate at the time of the appearance of the symptoms. Ten of the mothers were also assessed through the three projective tests; Draw-A-Person, Sentence Completion, and Thematic Apperception Test. In all cases, the child was found to have been rejected or neglected by the mother, or separated from her in the period just before the onset of the disorder. In 13 of the 22 cases, there was, in the authors' view, obvious or strongly suggestive evidence that the mother consciously or unconsciously rejected her child. This was expressed through rough handling of the child, neglect, or insufficient handling. In the other cases, where the children were separated from the mother or neglected by her for other reasons, no direct evidence for maternal rejection could be obtained through the interview. Because the fact that most of the children were aged five or younger, and all but two of the children developed the symptoms by their second year, the mothers were forced to remember the precise timing and nature of events that occurred some years previously. The fact that the investigators were able to determine the presence of maternal rejection or neglect in all cases despite this time period raises concerns about interviewer bias. The absence of a control group is also of concern.



With regard to the test results, Marmor et al. (1956) state "the fact that it was possible to obtain the cooperation of only ten out of our 22 mothers for these tests may itself be a corroboration of the high incidence of maternal rejection in this group (p. 602)". The mothers tested were found to be emotionally immature, frustrated in their self-expressive needs and showing overt or repressed hostility to their husbands. Although not overtly anxious, they were inwardly tense and rigid. Whitlock (1976) suggests that the uniformity of these findings raises the question of how unselected the mothers were. Of more importance, however, is the fact that it appears that the mothers were tested by a non-blind examiner, which raises the question of bias.

Altschulova (1971), on the basis of interviews and psychotherapy given to 23 children and their mothers, and to adolescents and adults who had suffered from infantile or atopic eczema, concluded that the personality of the mother was of crucial importance. This was particularly so once the symptoms had become established and there was a danger of a vicious circle being set up. Altschulova saw the development of the child becoming retarded due to poor eating, sleeping, and play patterns and that the child learned to use scratching as a means of controlling and overriding the wishes of the mother. This led to the development of an increasing ambivalence towards the child by the mother.

C. Solomon and Gagnon (1987) reviewed studies suggesting that maternal rejection is an important factor in infantile eczema, and other (mainly French) studies report that the mothers are highly anxious, hostile, and aggressive. They are critical of those studies that find the personalities of the children as overactive, anxious, aggressive, insecure, and hostile towards the mother, and those that maintain that the children have above average needs to be touched and held and that the mothers resist this need. As they point out, apart from one study, none were based on controlled direct observation of the children and their mothers. The authors designed a controlled, naturalistic, direct observation study. They were interested in two questions; did the mothers and children display the personality traits described in the previous studies, and are the dyads different from those in which the child does not have eczema. Seven mother-child dyads were compared with seven control dyads matched for age, sex, health status and socioeconomic status.

Three independent observers observed the dyads for two hours in the family home on five occasions while the child was aged between 29 and 45 weeks of age. They rated such aspects of behaviour as child's activity, child and mother's positive and negative expressions, mother's physical contact and so on. Ratings were made every fifteen seconds on observation sheets developed from the literature on infantile eczema and infant-child observation rating scales and tested over nine months on 18 pre-experimental dyads. Two particular forms of interaction were coded. In the first, one member of the dyad appeared to act with the intention of obtaining a response

from the other. The second type was those in which one member acted without such an intent. Mothers were also rated with regard to her sensitivity to the child's needs, her acceptance of the child, the degree with which she interfered with the child's ongoing activities, and the degree to which the mother is psychologically accessible. The observers rated the mother on the four scales after each of the visits. After each half hour of recording, the mothers were rated on two scales; one concerned with the expression of negative affect, and the other with the degree of response to distress on the part of the child. During the first and last visits, the mothers completed a measure of state and trait anxiety.

The results indicated that the experimental mothers did not differ from the control mothers in their degree of state or trait levels of anxiety, their acceptance, cooperation, and accessibility, expression of negative affect, or the frequency of spontaneous touching and holding of children, and the positive and negative qualities of such touching. The control mothers tended to be more sensitive to their children, but this trend was nonsignificant. While the experimental children were found to make more gross motor movements, they were not more active. They were also no more ill-humoured than the controls. There were no differences between the mothers in their response to moderate and intense crying, or in the quality and quantity of their comforting, holding, soothing, and touching of their children.

The major differences were related to the reduced sensitivity of the experimental mothers to their children unless the children were making direct, clear moderate or intense requests for attention. The same was true for the experimental children in relation to their mothers. Therefore, this study failed to find evidence of strong negative reactions on the part of the mother to her child, or of the child to the mother (C. Solomon & Gagnon, 1987). This was a good quality study with its emphasis on objective ratings of behaviour across repeated observations. Furthermore, the use of a control group for comparison purposes and independent observers makes this study methodologically superior to the other studies conducted on this topic. On commenting on the maternal rejection studies, Whitlock (1976) states that a parent-child relationship that is disturbed could perpetuate an existing dermatitis through itching and scratching, making the child's appearance more unattractive to the mother, and increasing the child's distress, setting up a vicious cycle. Given the lack of evidence found by C. Solomon and Gagnon (1987) that such disturbed parent-child relationships exist in eczema cases, it is best to heed those authors' advice to "be very prudent in attributing causes or psychomaintenance of eczema to parent or infant personality characteristics or dyadic interaction" (p. 219).

Koblenzer (1987, 1988; Koblenzer & Koblenzer, 1988) is the major proponent of disturbed mother-child relationships in atopic dermatitis. As outlined in chapter 1, she stressed the importance of childhood in the development of personality structure.

Children who have not received appropriate levels of tactile stimulation in infancy may regress to an infantile level of development in response to stress, with skin symptoms developing as a consequence. In atopic dermatitis, she saw the mother-child relationship being of key importance. Following the work of Spitz (1951) and others, she saw the mothers of atopic children as superficially anxious regarding the health and care of their infants. However, this anxiety was a defence against unconscious hostility that the mother was at times apt to reveal, sending the child confusing and inconsistent emotional messages. Koblenzer felt that often this maternal ambivalence was also reflected in a lack of strict controls on the child. The consequences of this disturbed mother-child relationship was the development of anxiety in the child, suppression of aggression, and the eroticism being centred in the skin (Koblenzer, 1987). Scratching was seen as weapon with which to manipulate the parents as guilt leads to an intolerance of scratching on the part of the mother (Koblenzer, 1988). However, she acknowledged that despite this dynamic formulation of the scratching behaviour, conditioning of the response, as demonstrated by the studies of Jordan and Whitlock (1972, 1974) was also a factor. The tendency towards lower itch thresholds as a result of histamine release and cutaneous vascular reactions also contributed substantially to the development of scratching behaviour.

A. Allen (1989) disagrees with Koblenzer's view of the mother as ambivalent and hostile. He felt that the poor parenting on the part of the mother was a secondary effect of the presence of major affective disorder, citing the association between affective disorder and atopic dermatitis. He suggested that although counselling may help people cope with major affective disorders, it was not an adequate treatment of the underlying disorder. He indicated that the standard treatment for affective disorder included the use of anti-depressant medication and this treatment approach should be adopted with the mothers of the atopic children. Koblenzer (Koblenzer & Koblenzer, 1989) defended her position, stating that none of the seven mothers of children referred to in her article (Koblenzer & Koblenzer, 1988) suffered from major affective disorder. Furthermore, she advocated the use of psychodynamic therapy over the use of antidepressant medication as a means of improving maternal care of the child.

#### *Criticisms of the maternal rejection approach*

In summary, then, the early studies that were conducted on this topic were methodologically flawed. C. Solomon and Gagnon's (1987) well-designed and controlled observational study did not support the maternal rejection hypothesis. Although Koblenzer (1987) still advocates this viewpoint, she is not without critics of her work (A. Allen, 1989). The approach now appears to have few adherents other than Koblenzer and is not representative of mainstream thinking.

### *Personality profile studies*

Dunbar (1943) believed that mental stimuli and emotions could lead to bodily changes. She felt that the inappropriate expression of emotional conflicts could create permanent tension, which, in turn, could produce long-term disorders in function. She adapted the first two laws of thermodynamics to provide an explanation for how this occurred. First, psychic energy that was not adequately expressed was released through the development of physical symptoms as a means of conserving the energy. Second, if these symptoms were the result of permanent damage, the energy was dissipated or wasted as a result of the faulty personality structure of the individual. As Grinker (1961) points out, Dunbar provided no evidence to support the applicability of these laws of thermodynamics to psychosomatic processes, nor did she provide an explanation of pathways by which the specific profiles created the disease syndromes.

Dunbar (1943) believed that specific personality profiles could be obtained for specific disorders and used interviews, free association, reporting of sensations and other techniques to develop these profiles. She was, however, not just concerned with personality organisation; in many respects she was an interactionalist in her approach. Dunbar believed that there was an organismic-environmental constellation of factors specific to each disorder. Her investigations, therefore, focused on factors such as the individual's life history and current situation, as well as their adjustment, characteristic behaviour pattern, and areas of conflict. She felt that this detailed and scientific approach could lead to the construction of specific personality profiles that were statistically verifiable for each group in 80 to 100 percent of cases and of diagnostic, prognostic, and therapeutic significance.

The major criticism of Dunbar's personality profiles is well summed up by Grinker; "The profile summaries are so similar, because so many general factors are included in them, that other observers have difficulty in making the necessary discriminations, much less anywhere near the same statistically significant correlations" (1961, p. 31). However, some more objective research has found support for a personality profile approach (e.g., F. Ring, 1957).

Following Dunbar's lead, other researchers have investigated the personality of sufferers of skin disorders. MacKenna (1944) felt that patients with skin diseases displayed particular personality types dependent on their diagnosis. Hysterical personality features were associated with dermatitis factitia; obsessional personalities with diffuse prurigo, lichen simplex chronicus, and pruritus ani; anxious personalities with rosacea, seborrheic dermatitis, pompholyx, and lichen planus; and narcissistic personalities with exudative dermatitis. Cormia (1947) examined forty cases of psychosomatic dermatoses and while he found a correlation between personality type and diagnosis, it was imperfect with many exceptions to the rule. Despite this, he

thought there was value in pursuing such an approach, though supplemented with examination of the predisposing and precipitating stimuli.

There have been a number of studies of this kind using atopic dermatitis sufferers. Klein (1949) found that for his 17 cases certain features occurred regularly. These were: a history of an unhappy childhood with a strict or rejecting bad parent; a reaction to conflict by avoidance and repression of aggressive impulses, a feature of a generally rigid super-ego formation, characterised by over-conscientiousness, obstinacy, excessive orderliness and other obsessional reaction formations. The amount of aggression that the patients were able to express openly varied, but the majority were overtly submissive, anxious to be thought well of, and apparently cooperative.

Walsh and Kierland (1950) examined 18 patients and found that while all the patients gave the impression of being dependent, narcissistic, constricted personalities with many intrapsychic conflicts, strong compulsive trends, and relatively poor social adjustment, the degree of personality constriction and intensity of intrapsychic conflict was much greater in those patients whose dermatitis had started in childhood than in those in whom it had started at a later age. However, this could mean that these features are more the result of the chronic disorder than its cause.

Cormia (1951), in a study of 9 patients, found five of them to have a severe mother fixation and this was displayed through resentment and even death wishes towards the mother. In contrast to other researchers, he found only three patients to be aggressive, while the rest were dependent and submissive. Compulsive-obsessional states were no more common than severe depression.

Whittkower and Edgell (1951) examined 90 cases of atopic dermatitis and neurodermatitis, 37 of whom were randomly selected from military hospitals, and 53 civilian cases who had been referred to the dermatology department of a hospital by their family physician and seen by the psychiatrist because of abnormal behaviour or lack of response to treatment. This latter group was, therefore, preselected as having potential psychiatric problems and, as such, could not be considered representative of atopic dermatitis patients. They were compared with 50 "war wounded" who were selected at random and interviewed for two hours. No information is given about the injuries of this group and they are not matched with the eczema cases on such factors as age and sex, bringing into question the validity of any comparisons. It is not surprising, then, that the eczema patients were found to be more deprived, overprotected, physically delicate and displaying more neurotic traits in childhood and adulthood.

Whittkower and Edgell (1951) examined 74 of the eczema cases in which they thought psychosomatic factors were clearly important and found two distinct groups. Twenty-eight were classified as Undisguised and were childlike and immature,

reluctant to express feelings for fear of offending, and tended to become dependent on the therapist. They were described as inelastic and inadaptible. In the Undisguised group, hostility was intolerable and a source of guilt and anxiety. There were three clusters in the Disguised group; the Resentful type of which there were 21 cases, 15 were Self-drivers, and 6 Lime-light Seekers. The Resentful group were hostile and uncooperative, while appearing calm, poised and friendly. Their underlying tension and repressed anger was "betrayed only in the rigidity of their muscular armour" (p. 213). For the Resentful cases, hostility was rarely expressed for fear of incurring hostility. Instead they tended to store it up and then tear strips off themselves. The other two clusters, the Self-drivers and the Lime-light Seekers were also poised and calm, but this was thought to cover an essential uncertainty. The Lime-light Seekers were the life of the party, but uneasy underneath. The Self-drivers frequently set themselves high standards of ethics and performance, which kept them in a constant state of anxiety.

Kepecs, Rabin, and Robin (1951) also divided their atotics into groups. Of their 20 subjects, many were hypnotised or engaged in long-term psychotherapy. They were administered a psychiatric interview and 15 were given Rorschachs. Fourteen cases were referred to as Emotionally Labile; these cases had greater chronicity of the disorder and had strong emotional drives with both libidinal and aggressive urges being expressed. The predominance of the hysterical Emotionally Labile group was at odds with a study by Greenhill and Finesinger (1942), who found more obsessives. The Rigid group had fewer cases and tended to disclose less of their conflicts. They were defensive and hostilities were glossed over. The Rigid group tended to suppress feelings at times, giving an impression of emotional impoverishment. Irrespective of group membership, patients were shy, timid and withdrawing and outbursts of anger were shortlived.

Kalz et al. (1954) compared 32 atotics with 8 urticaria sufferers, and 20 skin disorder free controls. They were interviewed with the aim of establishing a personality diagnosis with regard to basic conflicts, character defences, and adjustment in occupational, social, marital, and sexual areas. They divided the atotics in a similar manner to Kepecs, Rabin, and Robin (1951); those who restrain emotional expression to varying degrees and those who freely express their emotions. Twelve patients were described as Free; they were easily accessible, flexible, and cooperative, and expressed their emotions freely. The seven Restrained patients were rigid and tense, cold and distant, were unable to talk about their emotions and tended to bottle up their feelings. They would become restless and scratch when points of emotional significance were touched upon. Thirteen others were described by the authors as partially restrained. The use of a control group in this study by Kalz et al. (1954) is an improvement on the studies on personality profiles described above.

Kuypers (1968) examined 70 cases of eczema and failed to find a specific personality type. However, they did tend to show a strong tendency to suppress their emotions and feelings. He divided his subjects into three groups. The first group had character traits described as compulsive neurotic, where feelings of inferiority, irrational anxiety, excessive preciseness and accuracy were present. The second smaller group were more hysterical, being infantile, egocentric and having an immature attitude to life problems. The third group, while neurotically disturbed, were not easily classifiable. Kuypers (1968) felt that most of the patients he studied had difficulty with the expression of aggression, often directing it against themselves. He felt, however, that these personality features were a response to the disorder rather than a cause and that the suppression of feelings was not a special quality of patients with neurodermatitis but a characteristic of many other psychosomatic disturbances.

Another researcher who subdivided eczema patients into subgroups was D. G. Brown (1967, 1972). He compared 82 eczema sufferers (though only 73 were interviewed clinically) with 123 dental outpatient controls and found two groups of eczema sufferers. The first he referred to as Unstable, two thirds of the subjects being in this category. They admitted to psychological symptoms in the year previous to their outbreak of eczema, and of the 48 subjects in this group that were interviewed, 4 were thought to suffer from an anxiety state, 25 from a mixed anxiety and depressive state, and 7 from a depressive state. Nearly 70 % were thought to have a marked personality disorder. They were characterised as tending to bottle up their feelings, to often being very frustrated, and to often getting very angry. Eighty-two percent believed that stress was involved in their skin condition. The other third of the subjects were referred to as Superstable. This group did not admit to psychological symptoms. Although having the same number of recent stressors as the Unstable group, they would rarely refer to it as severe. Only 29 % of these patients believed stress was involved in their skin condition. Of the 23 patients of this group that were interviewed, only one was thought to have an anxiety state. Personality disorders were mild in form rather than marked. They were characterised by denying their emotions, and that emotions had a role to play in their skin disorder, rarely reported being angry, frustrated, or bottling up their feelings. This group was differentiated from the Unstable group by their very low levels of neuroticism compared to the higher than average levels of the Unstable group. When compared with the dental controls, the eczema group was more prone to be frustrated, to bottle up their feelings, and to get angry; however this difference was due to the characteristics of the Unstable group. The two groups did not differ on the expression of anger. The Superstable group, when compared with the dental controls was less likely to admit feeling frustrated and to bottling up feelings. They appear to be less aware of their feelings, tending to deny them.

D. G. Brown's (1967, 1972) research is of interest because of the subjects who were classified as suffering from eczema. In fact, only one patient suffered from atopic dermatitis; the other subjects suffered from disorders such as allergic contact, seborrhoeic, nummular, lichen simplex, hand or feet, and cases of obscure origin. The fact that these disorders appear to be affected by emotional stress and that the groups obtained by D. G. Brown are similar to those of the above mentioned researchers suggests that these groupings may not be limited to atopic sufferers but describe all skin disorder patients whose complaint is affected by emotional stress. The study does not indicate, however, whether these personality characteristics are a cause or an effect of the disorders, or due to some third factor. Furthermore, the fact that the eczema group was limited to those subjects whose eczema had lasted longer than six weeks, but less than three years, and who had had only one significant previous attack, makes the applicability of these findings to all eczema sufferers uncertain. However, despite these limitations, the study was significant because of its large number of subjects, use of a control group for comparison purposes and the fact that it attempted to relate issues of personality to perceptions of the role of stress in eczema.

*Summary and criticisms of personality profile approach*

To summarise the personality profile studies, three of the studies (Klein, 1949; Kuypers, 1968; Walsh & Kierland, 1950) found many of subjects to have obsessive-compulsive features. Cormia (1951) did not find this to be the case but his study only involved nine subjects. In a study to be reviewed later, Greenhill and Finesinger (1942) found higher levels of obsessive-compulsive features in not only neurodermatitis patients, but also discoid lupus erythematosus patients. In commenting on the high obsessive-compulsive scores for their two skin groups, Greenhill and Finesinger (1942) suggested that the raised obsessive-compulsive scores were a consequence of the disorder. The majority of the personality profile researchers found evidence of more than one type of personality profile. Those groups described as Resentful (Whittkower & Edgell, 1951), Rigid (Kepecs, Rabin, and Robin, 1951), Restrained (Kalz et al., 1954) and Superstable (D. G. Brown, 1967, 1972) are similar in their tendency towards emotional restriction, particularly the repression and denial of hostility. A more emotionally reactive or hysterical pattern was indicated by those groups called Undisguised (Whittkower & Edgell, 1951), Emotionally Labile (Kepecs, Rabin, and Robin, 1951), Free (Kalz et al., 1954), and the smaller group of Kuypers (1968).

The limitations with these studies are obvious. Methodologically, many of the studies are severely flawed. In some studies there are no control groups; in the others, the appropriateness of the control group used is questionable and no justification for their selection is given. A control group of persons suffering from a chronic disease,



if not a chronic skin disease would seem to be a more appropriate control group than a group of dental patients. However, the studies that did incorporate a control group such as Kalz et al. (1954) and D. G. Brown (1967, 1972) deserve credit for attempting to provide some comparison group. Second, the validity of the clinical interview as a means of objectively determining personality functioning has been subject to much criticism (e.g., Anastasi, 1982). The most significant flaw, however, is the fact that none of the studies referred to above were conducted blindly. The researchers were aware of the diagnosis of the patients when interviewing them, which makes it impossible to rule out the possibility that their preconceived ideas influenced their findings.

On theoretical grounds, the studies are flawed due to the lack of agreement between authors. Despite the reoccurrence of several themes such as unexpressed hostility, there is no consistent "atopic personality". Furthermore, in a review of Whittkower's work on the personality profile approach, Whitlock (1976) stated that most of the disorders had more in common with each other in terms of personality structure than they had differences between them. The research of D. G. Brown (1972), Kalz et al. (1954), Kepecs, Rabin, and Robin (1951), Kuypers (1968), and Whittkower and Edgell (1951) suggests that rather than search for a single "atopic personality", it would be more profitable to look for subgroups of patients. These studies have found more consistent results. Due to the methodological limitations listed above, it is impossible to say whether any personality features are characteristic of atopic dermatitis, an itching disease, a skin disease, a cosmetic disfigurement, a chronic disorder, or a combination of these (Rostenberg, 1959).

*An alternative approach to specific personality: Specificity-of-attitude*

At this point, an alternative to the specific personality profile approach should be mentioned. In the theory of Grace and Graham (1952), personality was not the feature that was specific to each disorder. Rather, they believed that there was an attitude associated with each symptom and without this attitude the disorder did not occur. To examine this, they interviewed nonblindly 128 patients with 12 symptoms. They were interested in the situations that were temporally associated with attacks of the patient's symptoms, a statement of what the patient felt was happening to him and what he wanted to do about it at the time the symptoms occurred. For the 27 eczema patients in the study, the individual felt that he was being interfered with or prevented from doing something and could think of no way in which to deal with the frustration. His preoccupation was with the interference and the persons or things thwarting him, rather than with the goals or aims. According to Grace and Graham (1952), any expression of an attitude without the corresponding symptoms developing was due to the feeling not being sufficiently intense or long-lasting, so that only transitory or

minor physiological changes occurred. (Another explanation may be that there was not the predisposition to this disorder which was activated by the physiological changes.)

D. T. Graham et al (1962) investigated this hypothesis further by interviewing two groups of subjects with a number of disorders. Half the interviews were conducted blind to the hypothesised attitude-disease links. All the interviews were taped and all references to symptoms removed. These interviews were judged by four blind judges who looked for the occurrence of an event, its significance, and the presence of an associated attitude. They then selected from a list of 18 the 3 most appropriate attitudes for that event, as well as ranking all 18 attitudes with respect to applicability. The judges selected the appropriate attitudes, that is, the attitudes predicted to be associated with a patient's disease, proportionately more often than they selected the same attitude when the subject had other diseases. Similar findings were found when the judges were required to rank all the attitudes for each patient. For every disorder, including eczema, the correct attitude was chosen more frequently and ranked lower than unpredicted attitudes.

Further evidence for the association between eczema and an attitude of frustration was also found in the study of D.T. Graham and Wolf (1953) which will be described in chapter 6. Other evidence supporting the specificity-of-attitude approach was provided by D. T. Graham (1962). D. T. Graham was also able to provide some physiological evidence to support his theory. This evidence will be reviewed in chapter 6 and although it has been criticised and not supported by other studies (e.g., Peters & Stern, 1971), it provided evidence for physiological mechanisms of the effect of attitudes that were consistent with the specific disorder.

A study which was not supportive of concept of complete specificity of the attitudes is that by Kogan, Dorpat, and Holmes (1965). The original intention of their study was to develop a reliable scale to measure the specific attitudes outlined by Grace and Graham (1952). One hundred and eleven statements were developed for the attitudes. They were then presented to 72 medical students who were asked to rate the association of each statement to each of the specific attitudes. They were also asked to rate the social desirability of each statement. The results indicated that the statements could not be reliably associated with the attitudes for which they were written. However, it was not that the overlap between the items and the attitudes was not random; there appeared to be associations between groups of items and groups of attitudes. To test this, Kogan et al. (1965) performed a cluster analysis on the averaged association of each item with each attitude. Item scores for each of the attitudes and social desirability was also calculated. The resulting pattern was verified on a second sample of students.

Two clusters of attitudes; backache, respiratory illness, diarrhea, and vomiting; and constipation, headache, were confirmed in both samples. The other cluster; urticaria, eczema, and duodenal ulcer were clearly associated in the first but not in the second. The attitudes in the second cluster also showed a high association with social desirability, while the first cluster is negatively associated with social desirability. Examination of these patterns showed that they corresponded to the Dollard-Miller theory of frustration that was elaborated by Rosenzweig (1978). (This theory will be outlined in more detail in the next chapter.) The first cluster, with its emphasis, on avoidance of the frustrating situation corresponded to a ego-defense strategy. The second cluster has the theme of persistence of the struggle in spite of the frustration. This corresponds to a need-persistive approach. The third cluster is focused on the barrier itself. It is obstacle-dominated. Therefore, the results of this study suggests that the attitudes of Grace and Graham (1952), are not independent of each other. This argues against, at least in part, their assertion of the specificity of the attitudes. Despite this lack of agreement in Kogan et al.'s (1965) study, D.T. Graham's work has several features of merit. First, he utilised differing disorders in his study for comparison purposes rather than examining a single group. Second, he utilised blind interviews and judges in the 1962 study (D.T. Graham et al., 1962). Third, he sought to find supporting evidence for his theory through psychophysiological studies, a feature he shared with Alexander (1950). However, his perspective has received little attention in recent years.

#### *Psychological test studies*

Those studies that have employed psychological tests to study the personality of atopic dermatitis sufferers have utilised three forms of tests; projective tests such as the Rorschach; the global self-report measure the Minnesota Multiphasic Personality Inventory (MMPI), or tests designed to test specific trait or state dimensions.

#### *Projective studies*

Lynch, Hinckley, and Cowan (1945) found that for their 17 subjects, tested on the MMPI and the Rorschach, the outstanding emotional feature was suppressed resentment, on which few subjects focused and which most had difficulty in verbalising. Anxiety was relatively nonappreciable. There was a strong tendency towards rigidity and high emotional reactivity masked by suppression, as well as a tendency towards exactness and meticulousity. Self assertiveness and social need were pronounced and there were varying degrees of inability to get along with, or effect adjustment with others. Hypochondriacal concerns were not common. A generalisation of personality type encompassing the highest end of each variable did not fit any individual patient.

Levy (1952) administered the Rorschach to 50 veterans suffering from neurodermatitis, which she defined as skin conditions that had an uncertain origin and were thought to be psychosomatic or neurosomatic. The group included 16 neurodermatitis cases, 11 of chronic dermatitis, 8 of eczematoid dermatitis, 8 of atopic dermatitis, most of which would very likely be diagnosed today as atopic dermatitis. Levy (1952), in an attempt to make a meaningful comparison, selected a control group of 50 patients with identifiable aetiology. It should be noted, however, that 21 were burns and explosion burns victims, whose appropriateness is questionable. The others were cases of mechanical and chemical irritation, fungus, and occupational allergic dermatitis. Six of the chemical irritation cases were eliminated due to uncertainty of diagnosis, and the two oldest cases were excluded to match more closely the experimental group. Chronicity and severity of disease was not controlled.

Levy (1952) hypothesised that the neurodermatitis cases would show a high degree of oppositional tendency or hostility, have a "burnt child attitude" (p. 41) (an unexplained term that Levy stated was often found in children subjected to parental rejection), and emotional rigidity and inflexibility. Despite the obvious problems of nonblind studies, she administered the Rorschach herself. It was noted the control group showed varying degrees of cooperation compared to the cooperative nature of the neurodermatitis cases. The controls, however, gave significantly more responses. Hostility was found to a marked degree in the neurodermatitis patients, but it was not expressed openly or directly. They also showed less emotional traumatisation and more flexibility and less rigidity than the controls. Levy (1952) stated that the controls did not represent a well-adjusted group, which is not surprising considering the proportion of them who had suffered trauma through accidental burns. It is difficult, therefore, to draw conclusions from this study.

McLaughlin, Shoemaker and Guy, (1953) examined 30 eczema sufferers using a psychiatric interview, the Rorschach, Thematic Apperception Test (TAT), and the Wechsler-Bellevue. They found their subjects to be guarded, tense, passively immobile, and denying of strong feelings of love or hostility. Anger was rarely expressed; rather the subjects scratched furiously and flushed vividly during emotionally disturbing subjects. Twenty of the subjects were considered to be dependent on the mother, and displayed no overt hostility. All the males were considered to be passive and dependent. McLaughlin et al. (1953) referred to the eczema subjects' profile as resembling that of other psychosomatic patients.

Seitz, Gosman, and Craton (1953) compared 35 patients with circumscribed neurodermatitis, and 29 patients with pruritic skin disorders presumed to be nonpsychogenic. No information is given regarding the diagnostic categories that constitute the control group so their suitability cannot be commented on. No differences were found between the groups on the scores measuring direction of

aggression, as measured by the Roszenweig Picture Frustration Study. However, the neurodermatitis group scored significantly higher on a measure dealing with super-ego patterns called intropunitive super-ego. This finding was interpreted as evidence that neurodermatitis patients tend to be masochistic and have strict punitive super-egos.

Fiske and Obermayer (1954) compared 21 patients with chronic disseminated neurodermatitis under treatment at a veterans hospital and 21 neuropsychiatric patients also drawn from veterans hospitals. The neurodermatitis cases were seen by two dermatologists, one of whom was Obermayer, which opens up the possibility of nonrandom selection. The fact that they were drawn from a hospital population also calls into question their representiveness of the neurodermatitis population. The controls were classified as 9 cases of anxiety reactions, 3 depressive reactions, 3 obsessive-compulsive reactions, 3 phobic reactions, 2 conversion reactions and a dissociative reaction and matched the neurodermatitis cases in terms of age, sex, race, intelligence, education, duration of symptoms, period of hospitalisation, and socio-economic status. Both the neurodermatitis and the control groups were individually administered the Rorschach, the Draw-a-Person, the TAT, and the Shipley-Hartford, as well as a biographical data sheet by the authors. After the results were scored, the data were submitted to three clinical psychologists for independent judgement. It is obvious, however, that this study could not be called blind; the role of the authors in the eliciting of responses, and their subsequent scoring precludes this. However, the attempt to include some independent judges must be recognised. Every patient's data was rated to the presence or absence of 39 characteristics that the literature suggested were of significance to the personality, emotional, and intellectual structure of patients with neurodermatitis and neurotic disorders. These ratings were evaluated through nonparametric statistics.

Many characteristics were present in both groups. These included: anxiety, strong hostile-dependent relationships, hostility to parents, guilt over hostile impulses, low stress tolerance, feelings of rejection by the strong parent, conflict over dependency needs, and so on. This led the authors to conclude that neurodermatitis was a subgroup of the neurotic population in general, though more homogeneous than the neurotic controls. Fiske and Obermayer (1954) stated that nine characteristics were specific to the neurodermatitis group. The basic personality structure of the neurodermatitis patients was characterised by anal and phallic elements. The first led to sadistic and masochistic traits, conflicts between aggression and submission, orderliness, obstinacy, guilt, and rigidity, among others. The phallic component led to features of narcissism, open aggression, tendency to emotional lability, exhibitionism, strong feelings of insecurity, and sexual confusion with erotisation of the whole body. This combination of features was said to be responsible for the confusion between compulsive and hysterical features in other studies. Whitlock

(1976), in commenting on this study, states " Such a catalogue of undesirable qualities seems hardly compatible with the ordinary social and clinical facts of life as experienced by atopic dermatitis patients....(and) one is bound to ask to what extent preconceived notions about the so-called neurodermatitis personality shaped these formulations " (p. 134).

Rabin and Kepecs (1954) reported the details of the Rorschach administered to the 15 atopic dermatitis sufferers in their earlier study described above (Kepecs, Rabin, and Robin, 1951). The cases were compared with two " control" groups. The first was a group of 48 normal adults from another study and the second was a group of 30 psychoneurotics taken from clinical files of the hospital. The use of such post hoc groups for comparison purposes is clearly inappropriate and no substitute for the collection of control data from groups comprising matched subjects and administered the Rorschach under similar conditions and by the same examiner. The atopics were administered the Rorschach by Rabin who stated that his findings were independent of those determined through clinical investigation by Kepecs in the earlier study. It is, however, likely that the two researchers shared similar ideas as to the expected results and this may have influenced the interpretation of subjects' responses.

As a group, the atopics tended to neglect whole percepts and emphasise the small, rare and insignificant details, a tendency seen in obsessive-compulsives. Rabin and Kepecs point out, however, that the group's results were affected by the responses of some subjects, and were not representative of all subjects. Human content, and human detail responses in particular tended to be more common in atopic dermatitis sufferers' responses, though not significantly. This feature indicates hypochondriacal and hysterical individuals, but again the results were influenced by individuals. Rabin and Kepecs (1954) suggest this may be a characteristic of other psychosomatic or somatic disorders. Analysis of colour and form structural factors indicated that the atopic group was quite immature and affectively labile in comparison to the other groups. Shading responses showed them to have more dysphoric affect, feelings of inferiority, inadequacy and insecurity. Exhibitionistic trends were not noted. Hostile-aggressive, depreciative and apprehensive responses were several times more common in the atopic group.

Rabin and Kepecs (1954) felt the results supported the subgroups determined by Kepecs in the earlier study (Kepecs, Rabin, and Robin, 1951). The Hysteroid group showed a marked dilation of personality with labile affect, readiness of self-expression, and over-reaction to affect. Eighty percent of the subjects fitted this pattern. The Rigid group had constricted personalities, hemmed in their affectivity, were guarded in expressiveness, and preoccupied with small and insignificant details. For both groups, hostility was close to the surface but accompanied by dysphoric affect and guilt due to inadequate handling of the hostility.

White, Jones, and Ingham (1956) administered the Rorschach to 102 patients with various neurodermatoses, comprising 17 rosacea, 9 urticaria, 10 seborrhoeic dermatitis, 9 pruritis ani, 8 pruritis, 5 atopic eczema, 5 dermatitis artefacta, 13 dyshydrosis, and 19 neurodermatitis patients. The cases were from a large group referred by a dermatologist for psychiatric evaluation. The authors admit that the cases "cannot be considered representative of the neurodermatoses in general, as cases were rarely referred for psychiatric opinion unless emotional factors were fairly obviously associated with the skin condition or a reasonable suspicion existed to this effect " (White et al., 1956, p. 84). Although the focus of interest in this study was differences between the groups, some data from a comparison group of 95 anxiety neurotics matched for age with the patients was used. Further details regarding the selection of this group are not given. The Rorschach was administered by one of the authors blind to the patient's diagnosis. Scored responses were chosen on the basis of being most indicative of emotional aspects of personality. The traits of anxiety, hysteria, tension, hostility, social adjustment, personal adjustment, and neurosis were also scored.

There were differences between the groups in three areas; the number of human movement responses, tension, and hostility. The human movement responses indicate the degree of maturity of the personality. While the rosacea, pruritis, and neurodermatitis sufferers were the most immature, the dermatitis artefacta, pruritis ani, urticaria, dyshydrosis, and atopic eczema patients were the most mature. The anxiety neurotics were between these two groupings. With regard to repressed hostility, the pruritis ani group displayed the most hostility, closely followed by the urticaria, seborrhoeic dermatitis, and pruritis groups. The anxiety controls again fell in the midrange. Tension, defined as the intensity of the affective drive and the tolerance of the individual, was normal for the pruritis ani, and pruritis patients, while the dyshydrosis patients had low tolerance of tension. The control group displayed normal tension levels. Of the disorders, the rosacea, seborrhoeic dermatitis, neurodermatitis, and pruritis sufferers were the most abnormal. The neurodermatitis sufferers were described as having an immature, constricted pattern with an inhibited affective response that was infantile and impulsive. There was, however, much inconsistency and many protocols were relatively normal. This inconsistency was also found in the clinical observations. The atopic eczema and dermatitis artefacta groups were the most normal. The eczema cases were described as showing strong obsessional trends and an ambivalent, constricted experience balance but, on the whole, normal. Hostility was not a feature of this group. The clinical observations of the eczema cases, however, found them to be immature, dependent individuals with hostile attitudes to one or both parents. This conflict was explained by the authors as reflecting the Rorschach's tendency to measure constitutional elements of the

personality, rather than characteristics acquired later. Alternative explanations are that the clinicians were influenced by prior hypotheses of the personality structure, or that the Rorschach was ineffective at identifying personality features. Irrespective of these issues, this study can be criticised on several grounds. First, the subjects are not representative of the skin groups as a whole, having been chosen on the grounds of the presence of "emotional factors". Second, the numbers in all groups are small. Third, the distinction between the atopic eczema cases and the neurodermatitis cases is now unclear. It is probable that dermatologists would today classify many of the neurodermatitis cases as atopic dermatitis. This makes the findings difficult to interpret. However, the study does have several features that are worthwhile. First, several skin disorder groups are compared in the study. Second, there is a control group for comparison with a nonskin disorder population. Third, the Rorschach was administered blindly to the subjects, decreasing the likelihood of experimenter bias.

Cleveland and Fisher (1956) compared 4 atopics, 2 urticaria, 2 lichen planus, and 17 neurodermatitis sufferers with 22 industrial burns, chemical and fungal irritations, and arthritic and low back pain sufferers on the Rorschach, TAT, Draw-a-Person, and a psychiatric interview. However, the 22 industrial skin lesion cases were taken from the 42 control cases used in Levy's (1952) study; consequently, the Rorschach was administered and scored by a different examiner. Furthermore, the same criticisms regarding the use of this control group by Levy apply to this study. Although Cleveland and Fisher state that the industrial skin lesions group were comparable in sex, age, education, and intelligence, the use of a control group not selected as part of the current study is a serious methodological flaw. The arthritis and low-back pain patients who were administered the TAT, Draw-a-Person, and interview also constitute poor controls from a methodological standpoint, being subjects in a previous study by Cleveland and Fisher (cited in Cleveland and Fisher, 1956). Although selected so that the neurodermatoses patients could be compared with a somatic illness control group, their use, and the use of the industrial skin lesion controls, does not substitute for the use of an appropriate group of skin disorder controls selected for the current study and administered tests under the same conditions.

The skin group was found on the Rorschach to have more responses of a depreciatory or masochistic attitude, more themes of hiding and covering things up, an armour plate facade, and a low incidence of hostile expression. On the TAT, they were not more exhibitionistic, but there was a lack of emotional expression on the faces, and a preoccupation with masochistic, martyred appeals to powerful authority figures. There were also more negative feelings expressed towards parental figures.



Klaber (1960) compared 20 neurodermatitis sufferers with 20 cases of lupus, contact dermatitis and other skin disorders presumed to be nonpsychogenic who attended a hospital dermatology department or a private dermatologist. They were assessed on the Manifest Scale of Hostility, a scale developed out of selected items of the Neurodermatitis Scale of Allerhand, Gough, & Grais (1950) and four additional items. The split-half reliability of this scale was low, raising questions about its suitability. Subjects were also administered some TAT cards, and a sentence completion task. Klaber found no differences between the groups with respect to overt hostility but admitted this was possibly due to the low reliability of the Manifest Hostility Scale. The TAT cards revealed more covert hostility for the neurodermatitis sufferers, though this was variable. The sentence completion task revealed no differences in levels of expressed hostility.

Ullman et al. (1977) compared 10 eczema sufferers selected from consecutive referrals from private and clinic patients, with a group of 9 normals selected from 50 volunteers and matched on age, sex, marital status, and race. Both groups were administered the MMPI, Draw a House, Tree, and Person, some TAT cards, and an interview by the authors. There was no differences on the validity and clinical scales of the MMPI, though they were able to be sorted blindly 80 % correctly by one of the authors. The TAT revealed poor emotional expression and emphasis on defence mechanisms of avoidance and denial. Only 30 % were aware of their anger and none could handle it appropriately, compared to 90 % of the controls who were aware of their anger and 50 % who could manage it adequately. Separation anxiety and dependency was found to be higher in the eczema sufferers. While the subject numbers are low in this study, there was comparison with a matched control group. Unfortunately, the subjects were not assessed blindly.

#### *Summary of the projective test studies*

Five of the projective test studies (Cleveland & Fisher, 1956; Klaber, 1960; Levy, 1952; Lynch et al., 1945; McLaughlin et al., 1953) found that their neurodermatitis/eczema/atopic dermatitis sufferers that suppression of hostile feelings was a key feature. One study (White et al., 1956) found that hostility was not a feature of atopic patients. This was based on only five cases, and was at odds with the clinical observations that detected hostility towards the parents. Seitz et al. (1953) found that neurodermatitis patients were more masochistic and to have strict punitive super-egos. Some studies (Cleveland & Fisher, 1956; Lynch et al., 1945; McLaughlin et al., 1953; Ullman et al., 1977) found that these patients were emotionally impoverished as a whole, not just with regard to the expression of hostility. Others (Fiske & Obermayer, 1954; Rabin & Kepecs, 1954) divided the patients into hysterical and obsessive-compulsive types, while White et al. (1956) only found evidence of obsessive patterns.

The projective test studies, therefore, found a broadly similar pattern of results as the personality profile studies, in terms of suppression of hostility, and hysterical and obsessive personality patterns. This was not without exceptions, though. The patients who constituted the groups studied varied greatly; some such as those used by Levy (1952) and Cleveland and Fisher (1956) were composed of several diagnostic categories. This argues against the view of suppressed hostility being a unique feature of atopic dermatitis. McLaughlin et al. (1953) commented that the profiles of their eczema sufferers resembled that of other psychosomatic groups.

#### *Criticisms of projective test studies*

The lack of nonblind designs and inadequate control groups in many of these studies limits their value. However, some studies attempted to incorporate these features into their design (e.g., Fiske & Obermayer, 1954; Ullman et al., 1977; White et al., 1956). The use of projective tests, whose validity and reliability, has been seriously questioned in recent decades. Whitlock (1976) provides a good summary of criticisms of the major projective tests used in these studies, and concludes that on the basis of their weaknesses and of the methodology of the above studies, "the findings from these studies ... must be regarded as of historical interest only (p. 58)".

#### *The MMPI studies*

In addition to the study by Lynch et al. (1945) in which specific findings for the MMPI are not given, and the study by Ullman et al. (1977) in which no differences were found, two other studies have utilised this self-report questionnaire in full. Gilberstadt (1962) administered the MMPI to 20 neurodermatitis patients with diagnoses of generalised neurodermatitis, localised neurodermatitis, dyshydrosiform eczema, and chronic urticaria, and 39 control subjects with more than 20 different skin disorders selected from a veterans hospital. Completed profiles were blindly sorted into types, and several profile types emerged. Forty percent of the neurodermatitis patients obtained a profile low in over-all elevation, with highest scores on Hypochondriasis (*Hs*) and Hysteria (*Hy*), compared to three percent of the controls. This profile type was said to be characteristic of individuals who do not show emotional symptoms but achieve this through emotional overcontrol and repression. This was supported, in Gilberstadt's (1962) view, by the fact that no neurodermatitis patient scored a highly elevated profile and a high Depression Scale. Also characteristic of the *Hs Hy* configuration are hysterical features and exhibitionistic tendencies. Twenty percent of the neurodermatitis patients obtained a profile with the highest elevation on the Psychopathic Deviate (*Pd*) scale which is characteristic of individuals who are hostile, aggressive, sarcastic, exhibitionistic, immature, and irritable. On the basis of these results, Gilberstadt (1962) argued against the idea of a single personality profile for neurodermatitis sufferers. Furthermore, he noted that the *Hs Hy* configuration was often obtained in other psychosomatic groups such as

low-back pain and psychosomatic ulcer patients, a finding inconsistent with the theory of specific personality constellations associated with specific disorders. This study is of merit due to its incorporation of blind assessment of the subjects and comparison with a skin disorder control group.

The other study that administered the full MMPI to atopic dermatitis sufferers was conducted by Haynes, Wilson, Jaffe, and Britton (1979). They administered the MMPI along with a clinical interview to 12 atopic dermatitis subjects referred from a local dermatologist for a biofeedback based treatment due to the ineffectiveness of standard treatments. All the *T*--scores were between the normal levels of 45 and 65, and there was no consistent pattern with regard to maximum scale scores or profile.

Schoenberg and Carr (1963), in an article concerning brief psychotherapy for neurodermatitis, describe the administration of the MMPI to 26 patients attending a dermatology department of a hospital who were selected for brief psychotherapy, following the work of Seitz (1953). Results are only discussed in terms of comparison of those whose skin condition improved and those whose skin did not improve. Two of the 26 cases had 6 or more MMPI clinical scales above a *T*-score of 70, 4 had 5, and 5 had 3 or 4 scales above this point. Only 8 had no raised scales. Although the scales are not identified, such results suggest the neurodermatitis cases displayed considerable psychopathology. However, the subjects probably were a highly selected sample.

#### *Summary of MMPI studies*

Other studies that will be reviewed below have used particular scales of the MMPI as part of a battery of tests administered to atopic dermatitis sufferers. The four studies that have administered the full MMPI have found conflicting results. The studies by Ullman et al. (1977) and Haynes et al. (1979) found no evidence of abnormal patterns or specific profiles for atopic dermatitis sufferers, though both used small numbers of subjects and, therefore, have limited generalisability. The study by Lynch et al. (1945) also found no particular personality pattern. Gilbertstadt (1962) did find a pattern common to 40 percent of his patients but his sample included subjects who were clearly not atopic dermatitis sufferers and who were inpatients at a veterans hospital which limits the generalisability of findings. There was also conflict between Gilbertstadt's (1962) study where the Hypochondriasis Scale was often elevated and the study by Lynch et al. (1945) who found that only three of 17 cases had raised hypochondriacal concerns.

#### *Criticisms of MMPI studies*

Despite its widespread use as a measure of personality organisation, there has been considerable criticism of the MMPI's reliability and validity (e.g., Anastasi, 1982). Its appropriateness, therefore, for studying the personality profile of atopic dermatitis sufferers is open to question. Whitlock (1976) makes a further case against

the use of the MMPI in such personality profile studies. He states that due to the consistency of such features as hostility, guilt, depression, and anxiety in these studies, that researchers should utilise tests designed to specifically measure these features rather than global measures of personality like the MMPI and the Rorschach. In their favour, the studies by Gilberstadt (1962) and Ullman et al. (1977) incorporated the use of a control group; in the former study's case this was a skin disorder control group. Furthermore, the study utilised blind assessment as well.

#### *Specific test studies*

There have been a considerable number of studies which have used psychological tests to examine the personality of atopic dermatitis sufferers. One of the first studies that investigated this question experimentally was also one of the better controlled studies. Greenhill and Finesinger (1942) wished to investigate the relation of neurodermatitis to the psychoneuroses, and the personality make-up of the atopic dermatitis sufferer in a controlled manner. Thirty-two cases of eczema were compared with three series of control groups; 16 sufferers of discoid lupus erythematosus, a skin disorder in which emotions were thought to play no role on lesion status, that was comparable in chronicity with eczema, and affected similar parts of the body. The second control group consisted of 20 psychoneurotic patients, hysterics, obsessive-compulsives, phobics and reactive depressives. The third group consisted of 20 control subjects with no complaints. The subjects were tested through a psychiatric interview and a questionnaire which was subjected to test-retest reliability checks. This questionnaire covered two broad areas. The first was concerned with issues such as neurotic symptoms in childhood, hysterical symptoms, phobias, anxiety, obsessive-compulsive tendencies, hostility, depression, feelings of inadequacy, and personality trends. The second part was concerned with the relation between environmental and emotional events and the subject's skin condition.

The results indicated that the atopics reported more neurotic, phobic, obsessive-compulsive symptoms than the normals, but less than the neurotics. The atopics and the lupus patients were equal for obsessive-compulsive symptoms. There was no difference between the nonneurotic groups with regard to hysteria and anxiety. Both the lupus and neurotic patients were more exhibitionistic than the atopics, however only the neurotics were more depressed and inadequate than the atopics. Significantly, the atopics reported more hostility and more suppression of anger than the other 3 groups and were equal to the neurotics with regard to sensitivity, lack of confidence, and shyness. Greenhill and Finesinger (1942), commented on the high obsessive-compulsive score of the two skin groups, reporting that many psychosomatic disorders occur in conjunction with obsessive-compulsive personalities. They suggested that diseases of a chronic nature may produce by their very chronicity personality characteristics of this type. This study is of considerable

merit due to its use of three control groups of subjects, including a skin disorder group in which psychological factors were thought not to play any role. The questionnaire, although not administered blindly, was subject to reliability checks.

Allerhand, Gough, and Grais (1950) used a questionnaire in order to investigate what psychological and attitudinal traits differentiated 30 cases of what they considered to be functional neurodermatitis, including atopic dermatitis and lichen chronicus simplex, from 30 organic skin disorders such as plantar warts, contact dermatitis, erythema induratum, scabies, hyperpigmentation and others. These two groups were also compared with a group of 30 general medical patients, suffering from such disorders as thyrotoxicemia, anemia, diabetes and so on. Twenty-six items differentiated the neurodermatitis patients from the other groups, including six items from each of the MMPI Depression and Hypochondriasis scales. These covered such tendencies as: impatience with others, irritability over minor frustrations, restlessness, difficulty in relaxing, moderate dominance, emphasis on inner strength and resourcefulness, and declared confidence in own health and vitality. These dimensions differ from those described in other studies, making comparisons with other studies difficult. The authors point to two major limitations of this study. First, there was no cross-validation of the questionnaire on another sample of neurodermatitis sufferers. Second, the lesions in the control skin cases were of lesser severity, and this may have led to some of the observed differences. Other limitations such as the small sample size and the lack of matching of groups on certain factors such as age and education were also noted (Allerhand et al., 1950).

There are a number of studies that have investigated particular personality features of atopic dermatitis sufferers through tests specifically designed to measure these features. Some studies, as Friedman and Booth-Kewley (1987) suggested, have administered a number of such tests to the same subjects. The most common features measured have been neuroticism and extraversion, measured through the Eysenck Personality Inventory (EPI) and the Maudsley Personality Inventory (MPI).

Sainsbury (1960) wished to investigate whether there was validity to the category of psychosomatic disease and that personality features were of aetiological significance in differentiating psychosomatic disorders from other physical illnesses. He hypothesised that the level of neuroticism would be higher in psychosomatic disorders, reflecting the lability of the autonomic nervous system that neuroticism was thought to be associated with. He hypothesised that if psychosomatic disorders are the result of prolonged physiological effects of emotional states such as anxiety, then patients with these disorders should be introverts, because anxious and depressed patients were introverted. The alternate hypothesis was that psychosomatic complaints reflect hysterical personality features, and as hysterics were relatively extraverted, the psychosomatic group should be extraverted.

He selected all out-patients attending 11 clinics at two general hospitals and administered the MPI to them, collecting a total of 1,352 valid responses. The doctors treating the patients were then asked to give a diagnosis to the patient. These diagnoses were divided into four categories, psychosomatic, possibly psychosomatic, neurotic, and control. Those diseases assigned to the psychosomatic group were done so on the basis of the opinion of leading writers on psychosomatic disorders, and included the usual disorders as well as chronic nasal infection, dysmenorrhoea, thyrotoxicosis, and pulmonary tuberculosis among others. There were 32 cases of eczema in this group. The possible psychosomatic group was chosen on the basis of the opinion of the consultants, patients in whom no organic cause could be found, and those with unusual or prolonged histories. Cervical erosion, chalazion, low-back pain, sterility, herniated disc, lupus erythematosus, and obesity cases made up this group. The neurotics were anxiety and reactive depression cases attending the psychiatric clinic. The remaining diagnoses, including appendicitis, cholecystitis, deafness, osteoarthritis, pregnancy, warts among others formed the control group. This group also contained cases of three chronic or severe disorders; poliomyelitis, rheumatic heart disease, and carcinoma.

While the mean neuroticism score of the neurotic group was much higher than the means of the other groups, the psychosomatic and possibly psychosomatic groups were significantly higher than the control group. These two groups were not significantly different from each other. The possibility that the higher neuroticism score of the psychosomatic group was due to greater chronicity of their disorder was discounted by comparing their results with the 67 chronic illness patients of the control group. This chronic group's score was not significantly different from the control group's mean score. With regard to extraversion, the neurotic group was significantly less extraverted than the other groups, and the psychosomatic group was significantly less extraverted than the other two groups.

When the 22 psychosomatic groups were examined individually, 18 out of the 22 had significantly higher neuroticism scores than the control group mean. Twenty of the diseases had an extraversion score below that of the controls; however, only 7 of these reached significance. The eczema sufferers scored the seventh highest on neuroticism, and the eighth lowest on extraversion.

Sainsbury (1960) concluded that the results support the idea that psychosomatic disorders are a consequence of prolonged physiological effects of dysthymic problems such as anxiety and depression acting upon a labile autonomic nervous system. That is, psychosomatic disorders are associated with the neurotic disorders, rather than hysterical disorders. The fact that the psychosomatic group scored lower on neuroticism and higher on extraversion than the neurotic group is explained by the role of other somatic factors determining their presentation. Given the homogeneity of the

pattern obtained by the psychosomatic group, Sainsbury concluded that these disorders have more similarities in their personalities than differences, arguing against the idea of specific profiles. The large number of subjects included in this study, as well as the use of four groups of subjects, including a neurotic control and medical control group are noteworthy features of this study.

Kenyon (1962) administered the MPI to 100 first referrals aged 15 or over attending and outpatient department of a dermatological hospital. The diagnoses included neurodermatitis, seborrhoeic dermatitis, viral warts, fungal infections, psoriasis, contact dermatitis, and eczema. Their MPI scores were compared to normal population norms, an unacceptable alternative to the use of a control group. The highest Neuroticism scores were obtained by the fungal infections, the viral warts, and bacterial infections. The lowest Extraversion scores were obtained by the bacterial infections, viral infections, and fungal infections. None of the scores for any of the subgroups, however, differed from the normal population norms.

D. G. Brown (1967) administered the EPI to 82 cases of eczema referred to the dermatology department of a hospital. He found that while they did not, as a group, differ from the Eysenck's normal population norms, when they were divided into the two subgroups described above (D. G. Brown 1967, 1972) there were significant differences. The Superstable group showed a lower Neuroticism score than the norms while the Unstable group had a higher Neuroticism score. Level of Extraversion did not differ between the subgroups, or between the subgroups and the norms. The two groups' Lie Scale scores were significantly higher than the norms; however, they were not different from each other, with the Superstable group only slightly higher. Again, it is worth noting that there was only one case of atopic dermatitis in this study so the generalisation of the subgroups to atopic dermatitis is probably inappropriate. Furthermore, like the study by Kenyon (1962), this study suffers as a result of the reliance on comparison with published norms rather than a control group.

Jordan and Whitlock (1972) compared 18 atopic dermatitis subjects with 18 medical ward patients with diagnoses of infectious hepatitis, neurological disorders, hypertension, chronic heart disease, hyperthyroidism and 3 uncertain diagnoses on the 16PF, the EPI, the Buss-Durkee-Hostility Inventory, and Welsh's Additional MMPI scales of anxiety and repression. Clinical assessment of the atopics found 4 to be essentially normal; 3 to show sociopathic or histrionic traits; 7 to be mildly obsessional; and 10 to display passive-aggressive qualities, experiencing anger and frustration they could not express. Of the control group, 11 were described as normal; 3 mildly obsessional; 2 sociopathic or histrionic; and 2 emotional unstable and anxious.

On the 16PF, the only scale that showed a difference was a measure of internal tension in the form of irritability, anxiety and worry, on which the atopics scored higher. The second order traits of neuroticism, anxiety, and introversion revealed no differences between the groups. According to the EPI, the atopics reported higher neuroticism, but were not more extraverted. The MMPI Additional Anxiety Scale indicated that the atopics were more anxious. The repression scale, detected no differences between the groups with regard to the repression of emotions. The two groups differed on three scales of the Buss-Durkee and did not differ on five others. The three scales were irritability, resentment, and guilt. The atopics also scored higher on Factor 1, which was a composite score from the sum of the resentment and suspicion scales and indicates unexpressed hostility. There was no differences between the groups on their Factor 2 score, which indicates levels of expressed hostility. These results support others' findings of greater levels of suppressed hostility and raised neuroticism.

However, in an important second study, Jordan and Whitlock (1974) compared the scores of the atopics with 18 anxiety disorder patients matched on sex, age, and level of anxiety. All previously observed differences were now non-significant. This finding has two implications for other studies. First, it suggests that there may be similarities between the atopic dermatitis sufferers and neurotics, a point other researchers reviewed above have stated. Second, observed differences between atopics and other groups on measures of expressed and felt hostility, as well as neuroticism, may be due to differences in the anxiety levels of the groups. This is supported by the research of Liakos, Markidis, Kokkevi, and Stefanis (1977) who found significant correlations between intrapunitive hostility and measures of state and trait anxiety. The use of matched anxious subjects in this study, and a medical control group in the first study, makes these investigations an important contribution to the literature. This is especially true because of their examination of the effect of anxiety on the measures utilised. This point will be considered in more detail later.

Al-Ahmar and Kurban (1976) administered the EPI, the Manifest Anxiety Scale, and the Depression, Hysteria, and Hypochondriasis scales of the MMPI to 12 atopic dermatitis sufferers, 12 patients with other unspecified dermatological complaints attending the same outpatient department, and 12 normal controls chosen from hospital personnel. The two control groups were matched for age, sex, education, and religion. Items from the scales were translated into Arabic separately by three translators and the most similar translations presented to eight judges for assessment of comprehensibility. Those items on which less than six judges failed to agree were rewritten. No data on the reliability or validity of these versions of the scales are presented.



The results indicated that the atopic dermatitis scored significantly higher on Neuroticism than the normal controls and the dermatological controls. They also scored higher on the Depression, Hypochondriasis, and Manifest Anxiety scales than both the control groups. The dermatological controls also scored significantly higher on the Manifest Anxiety, Neuroticism, Hypochondriasis, and Depression scales than the normal controls. Al-Ahmar and Kurban (1976) concluded, despite their small sample size, that the patient with atopic dermatitis is neurotic, depressed and highly anxious. However, the use of two control groups, including dermatological controls, was a positive feature of the study.

Brown and Kalucy (1975) compared four cases of eczema with four controls on the EPI and found the eczema sufferers were introverted neurotics. On the Foulds Hostility and Direction of Hostility Scale they tended to have a high level of aggression directed mainly towards the self. In a later study of 6 cases of eczema that included three cases of atopic dermatitis, Tantam, Kalucy, and Brown (1982) found that the eczema cases scored higher on Neuroticism and were more introverted than 6 controls comprising medical and nursing students not matched for age or sex. Only one of the eczema cases was depressed when assessed by the Beck Depression Inventory.

Garrie, Garrie, and Mote (1974) compared 45 eczema sufferers with 45 pityriasis rosea cases and 45 normals on the State-Trait Anxiety Inventory and found that the eczema sufferers had higher state and trait anxiety than either of the control groups. The use of an adequate number of subjects as well as matched dermatological and normal controls is a point of merit in this study.

Endicott (1965) compared 30 female neurodermatitis patients with two control groups, women with either contact dermatitis or fungal infection, and women with no skin disorder. Subjects completed an inventory which included a scale of felt hostility and a measure of self-report aggressive behaviour. The neurodermatitis patients scored higher than the other groups on the scale of felt hostility, but were not significantly different on the measure of aggressive behaviour. This meant that while the neurodermatitis sufferers felt more hostility they tended to suppress the expression of at least some of it. Other self-report data indicated that the neurodermatitis sufferers were more anxious than the two control groups, and more depressed than the skin disorder free controls. There were no differences between the groups with regard to levels of dependency. As with the study by Garrie et al. (1974), this study is to be commended for its use of a dermatological control group as well as a normal skin disorder free group. However, the interpretation of this study must take into consideration the findings of Jordan and Whitlock (1972, 1974) described above regarding the interrelationships between anxiety and hostility and aggression.

Faulstich et al. (1985) found 10 atopic dermatitis patients scored higher on the anxiety scale of the Symptom Checklist-90 Revised (SCL-90R) and were approaching statistical significance on the somatization, obsessive-compulsive, and depressive scales, compared with normal controls. If more subjects had been investigated in this study, these differences may have reached significance. The research of Greenhill and Finesinger (1942) suggests that the raised somatization and obsessive-compulsive scores are a result of the disorder. Furthermore, Sperber, Shaw, and Bruce (1989) found that subjects with chronic idiopathic urticaria displayed the same pattern of results on the SCL-90R. Their scores on the somatization, obsessive-compulsive, and depressive scales were all significantly higher than those of the control group, however. The results of Sperber et al. (1989) support the comments of Greenhill and Finesinger (1942) that the skin disorder may lead to obsessive-compulsive features.

Horne et al. (1988) examined the responses of 40 cases of atopic dermatitis recruited from a hospital dermatological clinic. They were administered a number of unspecified tests which included measures of neuroticism, hostility, anxiety, and locus of control among others. Compared to normative data for the tests, the atopic dermatitis cases showed higher levels of neuroticism, hostility, insecurity, anxiety, and suspicion. There were also more subjects classified as Type A and fewer as Type B than in the normative data. The lack of comparison groups is a major limitation of this study, though.

#### *Summary and criticisms of the specific test studies*

To summarise the ten specific test studies reviewed, six of the seven studies that assessed neuroticism found it to be raised in groups of atopic dermatitis or eczema sufferers. Of the two studies that did not, Kenyon (1962) used a mixed dermatological group of which eczema and neurodermatitis cases constituted a fifth of the sample, while D.G. Brown (1967), using 82 broadly defined eczema cases, found a subgroup comprising two-thirds of the sample had a raised neuroticism score. Both of these studies suffer the limitation of an absence of control groups.

The relationship of a raised neuroticism to atopic dermatitis symptoms is unclear, though. Bendien (1963) found little difference between psychosomatic and nonpsychosomatic patients on neuroticism. Furthermore, the scores of the nonpsychosomatic group on the neuroticism scale were closer to a psychiatric group than normal controls, though the study by Sainsbury (1960) reported above did not find this. Costa and McCrae (1980) found in a longitudinal study of males that medical complaints of many kinds were associated with high levels of neuroticism, and this was replicated in a longitudinal study of women (Costa & McCrae, 1987). There is also a body of evidence that indicates that those individuals scoring high in neuroticism report more physical complaints (e.g., Blazer & Houpt, 1979; McCrae, Bartone, & Costa, 1976).

Costa and McCrae (1987), in a review of the relationship between neuroticism, somatic complaints, and disease, also rule out the alternate hypothesis that illness of any kind leads to increases in neuroticism, pointing out that while acute illness or recent diagnosis can lead to temporary fluctuations in state measures of anxiety or depression, individuals adapt to illness without change to their personality. As further evidence of the stability of personality, illness increases with age, but neuroticism does not (McCrae & Costa, 1984).

Costa and McCrae (1987) argue that the relationship between neuroticism and disease is due to the effect of over-concern with somatic symptoms leading to biased perceptions, recollections, and reporting of medical symptoms by individuals high in neuroticism. This leads to such individuals utilising the medical system more frequently, and hence, being selected for studies such as those reviewed above. This is supported, according to Costa and McCrae (1987), by the lack of a relationship between neuroticism and mortality, except where it is mediated by neuroticism-affected behaviour such as smoking, alcoholism, accidents, homicide, and suicide.

In a second important implication for the interpretation of the above studies, Costa and McCrae (1987) point to the fact that the individual high in neuroticism by definition has a tendency to experience negative, distressing emotions. In their operational definition, neuroticism is seen as a broad factor of maladjustment with six more specific component traits: anxiety, hostility, depression, self-consciousness, impulsiveness, and vulnerability. The first three of these were the focus of investigation in many of the ten studies reviewed. Of the four studies that assessed neuroticism and at least one of these three specific domains, three found the predicted pattern; the fourth (Tantam et al., 1982) employed only six subjects. None of the studies, presented the correlations between the measures.

Seven studies investigated the dimension of extraversion. Three studies found the atopic/eczema patients to be introverted. Two of these studies (D. G. Brown & Kalucy, 1975; Tantam et al., 1982), however, used only 4 and 6 cases, respectively. Two of the studies that failed to find a link between atopic dermatitis/neurodermatitis/eczema (Kenyon, 1962; D. G. Brown, 1967) did not use control groups, relying on comparison with published norms.

Six studies assessed anxiety in atopic dermatitis patients and found they were more anxious than nonpsychogenic dermatological disorders (Endicott, 1965; Garrie et al., 1974; Al-Ahmar & Kurban, 1976), medical patients (Jordan & Whitlock, 1972), normals (Endicott, 1965; Garrie et al., 1974; Al-Ahmar & Kurban, 1976; Faulstich et al., 1985), or normative data (Horne et al., 1988).

Four studies examined depression in atopic dermatitis sufferers. Two found they were more depressed than dermatological controls as well as normals (Endicott, 1965; Al-Ahmar & Kurban, 1976), while in one study (Faulstich et al., 1985) the difference between the atopics and the normals was approaching significance. The study that failed to find a difference (Tantam et al., 1982) involved only six eczema subjects. However, the instruments used to assess depression in some of the reviewed studies have been subject to criticism. For example, the MMPI Depression scale used in the study by Al-Ahmar and Kurban (1976) has been criticised by Costello and Comrey (1967) as lacking discriminant validity from anxiety.

All three studies that examined the issue of felt versus expressed hostility found that the atopic/eczema sufferers tended to direct hostility inward rather than express it compared to dermatological (Endicott, 1965), medical (Jordan & Whitlock, 1972), or normal controls (Endicott, 1965; D. G. Brown & Kalucy, 1975). Horne et al. (1988) found their subjects were more hostile than normative data but did not mention whether this hostility was suppressed. Interpretation of this finding must take into consideration the results of Jordan and Whitlock (1974) and Liakos et al. (1977) where such intrapunitive hostility was found to be associated with anxiety. Furthermore, Carmody, Crossen, and Wiens (1989) found that a chronic hostile attitude was positively associated with measures of neuroticism and anxiety in healthy males. D. G. Brown and Kalucy (1975) did not examine levels of anxiety, while the other two studies found it to be raised.

To summarise, the findings of these studies that atopic dermatitis sufferers score highly on neuroticism, anxiety, depression, and intrapunitive hostility must take into account two considerations. First, the issue of the association of anxiety, depression, and a chronic hostile attitude with each other and with neuroticism. The association of these factors with atopic dermatitis may be due to this group's raised neuroticism level. Second, the issue of how specific such a pattern is must be considered. Lyketos, Stratigos, Tawil, Psaras, and Lyketos (1985) examined three other skin disorders thought to have a psychosomatic component; urticaria, psoriasis, and alopecia. Subjects in these groups whose condition could not be explained by nonpsychological factors were compared with nonpsychosomatic skin patients. Analyses indicated that all three psychosomatic groups were less able to adopt a domineering attitude and act in an uninhibited hostile manner. They were more likely to be intropunitive, or self-critical, and extrapunitive, or have hostile thoughts and attitudes towards others. That is, they tended to repress rather than express their hostility. They were also more anxious and depressed than the control group. There were no differences between the three experimental groups. Present State Examination results indicated that the urticaria sufferers were more likely to suffer from anxiety states, while the alopecia sufferers were more likely to suffer from depressive states.

While this study did not examine neuroticism levels, it does suggest great similarity between the subjects and the atopic dermatitis subjects. This argues against a specific atopic dermatitis personality.

*The decline of the personality study approach*

To summarise the criticisms of the above studies, serious inadequacies existed methodologically because of confusion in terminology, particularly with regard to neurodermatitis; a lack of adequate controls such as blind studies; inappropriate control groups, the use of assessment strategies such as interviews and projective tests whose reliability and validity has been questioned; and reliance on global measures such as the MMPI rather than specific validated tests of personality features. Even those studies that have used such specific tests have often failed to distinguish between assessing enduring personality traits and fluctuating emotional states (Whitlock, 1976).

Only six studies (Al-Ahmar & Kurban, 1976; D. G. Brown & Kalucy, 1975; Endicott, 1965; Horne et al., 1988; Jordan and Whitlock, 1972, 1974)) employ the strategy suggested by H. Friedman and Booth-Kewley (1987) of administering several tests that assess a number of personality dimensions to a sample of patients. Of these, only the studies by Endicott (1965) and Horne et al. (1988) used adequate numbers of subjects, but the latter is limited by the lack of control groups. Another major criticism of many of the studies listed above is the lack of appropriate control groups. Some studies did not use a control group, others employed psychogenic skin disorders, nonpsychogenic skin disorders, other psychosomatic disorders, or neurotics. As Robbins (1969) points out, this makes comparisons between studies difficult. What constitutes an appropriate control group, however, depends on the question one hopes to answer. For example, if one is interested in whether the personality of atopic dermatitis sufferers is the same as that of other psychosomatic disorders, then control groups of psychosomatic disorders would be appropriate. Since most of the studies were conducted in search of a specific atopic dermatitis personality rather than similarities with other groups, the most appropriate group would be a chronic skin disorder. Unless this group is selected, it is impossible to say whether any observed features are characteristic of atopic dermatitis, a skin disease, an itching disease, a chronic disorders, a cosmetic disfigurement, or some combination of the above (Rostenberg, 1959).

Another important criticism of the personality studies is that they are cross-sectional in design, with most examining the personality of people with established atopic dermatitis. Such an approach is of limited value because the interpretation of cause and effect relationships is impossible. Too often the researchers have made the assumption that any features found are the cause of the atopic dermatitis, rather than considering the possibility that they are the result of the

long-standing disorder. This is particularly true with regard to states such as anxiety and depression that were confused with more stable personality traits in many studies. As Whitlock (1976) stated many investigators "have failed to distinguish clearly between enduring personality traits and particular states of relatively brief duration antecedent or concomitant with the dermatitis, or occurring as an understandable reaction to the unpleasantness of the condition" ( p. 59).

#### *The effects of skin disorder on individuals*

There have been few studies that have investigated the effect of skin disorders on individuals. Porter and Beuf (Hill-Beuf & Porter, 1984; Porter, Beuf, Norlund, & Lerner, 1978) investigated the impact of vitiligo, a disfiguring disease that involves depigmentation of the skin of the face, hands, and other areas. In the first study, 62 patients responded to a questionnaire. Their responses indicated that the group as a whole experienced much anxiety and psychological distress as a result of their condition. Many of the sample were extremely depressed as a result. Two-thirds reported experiencing considerable embarrassment, feeling uneasy in social situations. Others felt they had lost job opportunities as a result of the complaint.

Hill-Beuf and Porter (1984) interviewed 19 children with vitiligo. While younger children appeared to be unaffected by their disorder, fifty percent of the children over the age of 10 were moderately, or very concerned about their disorder. Gender did not affect degree of distress. Better emotional reactions were associated by the acquisition of skills in late adolescence or by feelings of competency.

Shuster, Fisher, Harris, and Binnell (1978) in a study on the effect of skin disease on self image investigated the responses of patients with acne, eczema, and psoriasis. This was achieved by the use of a grid of faces previously rated for age, happiness, attractiveness, and likeableness. While there was a strong correlation between "like me" and "desirable" characteristics in control subjects, in cases of severe acne there was a decline in both self image and belief in what others thought of it, as well as a significant correlation with attributes of "someone I dislike". This trend was more marked in females. Eczema and psoriasis sufferers had a less damaged self image which the authors related to different sites of involvement.

Jowett and Ryan (1985) investigated the impact of skin complaints, interviewing all people over 16 attending an outpatient clinic for treatment for acne (30 cases), psoriasis (38 cases), and eczema (32 cases) whose disorder was of greater than twelve months duration. Both the eczema and psoriasis cases had suffered their disorder for a mean of 13 years, while the acne cases had suffered for a mean of 7 years.

The eczema sufferers rated the worst aspect of the disorder as being the physical irritation. All complained of the itching and a third of the pain associated with outbreaks. A fifth felt their physical appearance was of concern. While 35 % of the

eczema sufferers had experienced no impact of their disease on employment, 16 % complained of limited opportunity, 42 % of functional difficulty, and 19 % of interpersonal difficulties as a consequence of being afflicted with eczema. This was roughly the same impact experienced by the psoriasis sufferers. With regard to emotional impact, 78 % of the eczema group had experienced shame, somewhat less than the psoriasis sufferers. Sixty-three percent of the eczema sufferers had experienced anxiety about their condition, and 38 % reported having felt depressed. The impact on eczema sufferers was greater than for the other two groups, with the exception that the acne sufferers experienced equal anxiety. About forty percent of both eczema and psoriasis sufferers admitted to a lack of confidence as a consequence as a result of their condition. Nearly 50 % of the eczema sufferers felt their family life had been affected compared with 25 % of the psoriasis patients.

Hughes, Barraclough, Hamblin, and White (1983) assessed 176 outpatients and 40 inpatients on the General Health Questionnaire (GHQ), a screening self-report instrument to detect neurotic symptoms. Thirty percent of the outpatients and 60 % of the inpatients scored above the cutoff point, and these were administered an interview and the Wakefield Self-Assessment Depression Scale. Fifteen percent of the outpatients and 33 % of the inpatients scored high enough on this second measure to indicate the probability they were experiencing symptoms of depression.

Examination of the effect of type and site of lesion indicated that 70 % of those whose disorder affected the face or hands scored high on the GHQ. This included disorders such as eczema, psoriasis, and acne and is almost double the incidence of Jowett and Ryan (1985). Patients whose lesions were small, irrespective of whether they were benign or not, and those with no visible lesion obtained lower scores. Only patients with alopecia scored higher. Like Jowett and Ryan (1985), Hughes et al. (1983) found that the skin disorder had considerable impact with nearly half the high GHQ scorers complaining of sleeplessness, and a third of avoiding people and parties and stopping hobbies. The authors concluded the raised GHQ and reported depressive symptoms were a consequence of the skin disorders. Monroe and Steiner (1986), however, note there is a great deal of similarity between approximately half the items on the GHQ and the EPI's Neuroticism Scale.

These studies indicate that skin disorders such as eczema can have a profound effect, not only on the lifestyle of the sufferer, but also on their emotional state. Poor self image, anxiety, depression, embarrassment, and lack of confidence were frequent consequences noted. Such findings must be taken into consideration when interpreting the findings of the studies which have detected greater incidences of such states in eczema sufferers and assumed an aetiological role to them.

When it comes to determining the impact of atopic dermatitis, or any illness, on the personality of an individual, there is little research that has been conducted. Kuypers (1968), for example, felt that "too little attention had been paid to the fact that the disease cannot leave the personality structure undisturbed" (p. 389). There are two main reasons for this. First, personality traits are thought to be enduring dispositions that remain stable across the lifetime and research indicates that this is the case (McCrae & Costa, 1984). Studies have indicated that while illness can affect emotional states such as anxiety or depression, marked changes to personality or adjustment do not persist (Brickman, Coates, & Janoff-Bulman, 1978; Costa, McCrae, Andres, & Tobin, 1980; Palmore, Cleveland, Nowlin, Ramm, & Seigler, 1979).

On the other hand, Keltikangas-Järvinen (1989) examined whether personality features that had been identified as associated with the disorders ulcerative colitis, duodenal ulcers, and irritable colon syndrome, such as egocentricity, dependence, and obsessionality were just illness-related reactions. A group of 101 patients suffering from these disorders were compared with a group of patients with gallstone disease, inguinal hernia, or varicose veins. Both groups were composed of recent onset patients who were assessed blindly on a self-report personality measure. The groups were then assessed blindly at 18 months follow-up. As a result of disease-specific reactions; reactions to being ill, both groups at follow-up became more egocentric, aggressive, self-doubting, dependent, suggestible, orderly, obstinant, and developed stronger superegos. Exhibitionism and perseverance were personality-specific variables that constantly differentiated the groups. Emotionality was a personality-specific reaction to illness, the control group found it difficult to control their emotions when sick but their scores decreased when they were well, the experimental group displayed the reverse pattern. Keltikangas-Järvinen (1989) argued the results indicate that many features previously associated with the experimental group's diseases may be disease-related reactions common to many diseases.

Second, as Robbins (1969) points out, one way to determine cause and effect relationships between personality and illness would be to run prospective studies. Because such studies take a long time, and require large numbers of subjects, few have been conducted. Their appropriateness with atopic dermatitis could be questioned, however, due to the fact that onset in the majority of cases is before the age of five (Champion & Parish, 1986), making assessment of pre-morbid personality impossible.

One longitudinal study that has been conducted was by Rechardt (1970). He evaluated 30 atopic dermatitis sufferers aged 15 and over through a psychiatric interview and the Rorschach. He found that during this acute phase of their disorder, most displayed a neurotic-depressive state of decompensation, with acting-out



behaviour, and regression manifested by: intense dependence, increased emotionality, lack of self-control, impulsiveness, transference feelings of aggression and eroticism, and feelings of jealousy, rivalry, self-pity, helplessness, and masochism. Hysterical features were also common. There was no one pattern, however. When 25 of these patients were followed up nine years later, the skin symptoms were absent or mild in form and the regressive features previously noted were rare and mild in occurrence. This was particularly so for feelings of dependence and impulsivity. The most common features at follow up were defensiveness, reserve and self-control that were overstrained, though Rechart acknowledged this may have been due to the interview situation. The MMPI was administered to 15 of the 25 patients followed up and their profiles were mainly free of any identifiable pathological personality traits. For the three male cases, the Depression, Hypochondriasis, and Hysterical scales were raised slightly, which Rechart interpreted as reflecting a psychosomatic type of reacting and anxiety. Both males and females were introverted and believed their egos were relatively strong (Rechart, 1970). Whitlock (1976) in commenting on this study, argued that previous researchers had mistaken the temporary emotional disturbances observed during acute relapses of the disorder for enduring personality characteristics.

The possibility that emotional disturbances noted in atopic dermatitis sufferers are not just associated with acute exacerbations is suggested by the study of Baldaro, Bossi, Brocani, and Offidani (1984). They compared 12 psoriasis sufferers and 12 normal controls who completed a number of questionnaire regarding psychological symptoms at 15 day intervals over a four month period. The psoriasis sufferers were found to score more highly than the controls on the factors anxiety, depression, hostility, and somatization. However, their scores did not appear to be dependent on variations in their skin symptoms. This suggests that emotional disturbances in skin disorder patients may be more enduring. However, this may reflect the association of these factors with the more stable personality dimension of neuroticism, which was not assessed in this study.

#### *Theoretical limitations of the studies*

From a theoretical point of view, these studies failed on four grounds. First, they failed to agree on what constituted the personality of sufferers of atopic dermatitis. Even when there was relative agreement, such as in the case of heightened neuroticism, the implications of this are ambiguous, given the review by Costa and McCrae (1987). Suppressed hostility and anxiety; consistently but not unanimously reported; are also cast into doubt due to their association with each other (Jordan & Whitlock, 1974; Liakos et al., 1977) and to neuroticism (Costa & McCrae, 1987). Those studies that attempted to describe subgroups (Whittkower & Edgell, 1951; Kepecs et al., 1951; Kalz et al., 1954; Kuyper, 1968; D. G. Brown 1967, 1972) were marginally more consistent. Even so, as Grace and Graham (1952) pointed out, many

people who had a disorder like atopic dermatitis did not have the specific personality, while other people had the personality pattern but not the disorder. Furthermore, many people suffered from a number of symptoms throughout their life, often with rapid changes, a finding difficult to reconcile with the idea of fixed personality-disease connections.

The second theoretical failing of these studies was that they were unable to demonstrate consistent specific personality differences between psychosomatic disorders. Both Dunbar and Whittkower's specific personality approach were criticised because the disorders appeared to have more in common with each other than differences between them (Whitlock, 1976). Other studies (e.g., Kenyon, 1962; Sainsbury, 1960) failed to find differences in personality features between various dermatological and psychosomatic diagnoses.

A third theoretical failing was an inability to provide pathways by which these personality features or intrapsychic conflicts would lead to the development of skin lesions. Those that did speculated on the role of changes in autonomic nervous system activity (e.g., Urbach & Gottlieb, cited in Beerman, 1962). Some who did provided theoretical explanations (e.g., Alexander, 1950) or were unable to show that personality or emotional features were associated with observed physiological changes in the laboratory, or that these changes led to the disorder (Grace & Graham, 1952, Graham & Wolf, 1953). Some, like Jordan and Whitlock (1972, 1974) who emphasised the role of conditioning, appeared to have more success.

Perhaps the most important theoretical failing of the personality studies was the assumption of a specific cause-effect relationship with psychosomatic disorders. Advances in the knowledge of genetic, immunological, physiological, and pharmacological and other factors reviewed in chapter 1 and the development of the multifactorial biopsychosocial approach to disease (Engell, 1977) and psychosomatic medicine (Lipowski, 1977) made this view untenable.

#### *The "disease-prone personality"*

H. Friedman and Booth-Kewley (1987) performed a meta-analysis of 101 studies that investigated the personality dimensions anxiety, depression, extraversion, and two combinations of the personality variables anger/ hostility and anger/ hostility/ aggression in five diseases; coronary heart disease, asthma, rheumatoid arthritis, headache, and ulcers.

Overall, their analyses showed that the magnitude of the relationship between the personality variables and disease was in the order  $r = .10$  to  $.25$  of a product-moment correlation coefficient. This was equivalent to the degree of relationship between such risk factors as cholesterol and smoking and coronary heart disease. With regard to the specific diseases, all five personality variables were associated with coronary heart disease with depression and anger/ hostility and anger/

hostility/ aggression to the same degree as they (Booth-Kewley & Friedman, 1987) had observed between Type A and coronary heart disease. For asthma, anxiety, depression, and anger/ hostility/ aggression, and introversion were positively and reliably associated with disease. A similar, but weaker, pattern was found for rheumatoid arthritis, while for ulcers, associations with anger/ hostility/ aggression were not significant. For headaches, anxiety and depression were positively and reliably associated with illness. So for all diseases, there was a significant link between anxiety and depression and illness, and for three anger/ hostility/ aggression is associated. There was greatest variance on the dimension of extraversion; asthma, ulcers, and arthritis associated with introversion, the other two disorders having small associations with extraversion. Artifacts due to shared method of assessment of personality and disease, and subject selection procedures were ruled out as primary reasons for the results. These results, in H. Friedman and Booth-Kewley's view, argued against specific personality variables causing specific diseases, or that specific diseases cause specific personality problems through direct physiological means, but supported the contention of a generic disease-prone personality.

Malatesta (1988) criticised H. Friedman and Booth-Kewley's conclusion of a lack of evidence for specificity. She stated that the meta-analyses conducted were not a valid test. First, she feels although they tested for artifacts due to shared method variance for assessment of personality and disease, they did not consider the issue of common method variance across personality tests. She felt studies with a relationship between disease and personality, may reflect a disposition to report emotional feelings, let alone report feeling and illness. Despite this possibility, she feels that there may be an emotion-specific/ disease-specific pattern superimposed on this general trait. To uncover this, she argues, studies are needed that either administer a number of personality measures to a group of patients with a disease or to administer a variety of diseases a variety of personality measures. The meta-analytic technique used by H. Friedman and Booth-Kewley (1987) prevented this by allowing each sample to contribute only one effect size per personality variable (Malatesta, 1988).

Linden (1988), in his comments on the study, expressed the need to consider the possible confounding effects of self-deceptive/ repressive styles of reporting. He argued that low anxiety or depression scores may reflect individuals who repress negative affect, do experience the particular emotion, and are at increased risk. Not to do so would reduce the possibility of finding personality-disease links through correlational means.

H. Friedman and Booth-Kewley (1987) is not the only study to have found support for the concept of a disease-prone personality. Rimé et al. (1989) assessed the presence of Type A behaviour and self-reported diseases such as coronary heart disease, scarlet fever, asthma, liver disease, peptic ulcer, renal disease and so on in

1949 adults. Type A patients reported not only more coronary heart disease, but also more rheumatoid arthritis, peptic ulcers, asthma, and thyroid problems. Despite the fact that four of the five diseases were psychosomatic-type diseases, further analysis revealed that they reported more illnesses that were non-psychosomatic as well. The possibility that the self-report of illness reflected a disposition to report symptoms was discounted by the authors due to the fact that illnesses rather than symptoms were assessed and that previous research had indicated that Type A people were more likely to deny physical symptoms. They conclude that the results of their study are consistent with those of H. Friedman and Booth-Kewley (1987), and that the Type A behaviour pattern may represent another facet of a general disease-prone personality.

#### *A meta-analysis of atopic dermatitis studies*

As can be seen from H. Friedman and Booth-Kewley's (1987) study, meta-analysis provides an alternative to the traditional literature review. Given the difficulty in evaluating the results of the numerous studies reviewed in this chapter, meta-analysis may be a useful approach. Furthermore, many of the variables reported to be associated with atopic dermatitis are the same as those found by H. Friedman and Booth-Kewley (1987) to be associated with disorders such as asthma, ulcers, arthritis, coronary heart disease, and headaches. Therefore, a meta-analysis of the atopic dermatitis studies would enable the applicability of the concept of the disease-prone personality to atopic dermatitis sufferers to be determined.

#### *Location of studies*

Potential studies investigating the relationship between personality and emotional factors and atopic dermatitis were located in several ways. First, a visual search was made of *Psychological Abstracts* from 1940 onwards under the following subject headings: "allergic disorders", "allergic skin disorders", "atopic dermatitis", "dermatitis", "eczema", "neurodermatitis", "skin disorders", and "psychosomatic disorders". All English language papers were located that reported an investigation of personality or emotional factors in atopic dermatitis, dermatitis, eczema, neurodermatitis, or any of the other names that have been applied to atopic dermatitis (see chapter 1) and which involved a comparison with some other subject group. Second, a manual visual search was made for similar articles of all the contents pages of the following relevant journals for all issues published from 1940 onwards: *Archives of Dermatology*, *British Journal of Dermatology*, *Journal of Psychosomatic Research*, and *Psychosomatic Medicine*. Third, suitable studies referred to in reviews of the literature on personality and atopic dermatitis by Robbins (1969) and Whitlock (1976) were located. Fourth, the reference lists of all articles obtained by other means were examined to locate any articles not identified by the other methods.

### *Criteria for inclusion in meta-analysis*

To qualify for potential inclusion in the meta-analytic review, studies were required to fulfil certain criteria. First, they were required to examine the variables selected for investigation. These variables are outlined in the next section. Second, the studies were required to provide a comparison on at least one of the variables between atopic dermatitis sufferers or neurodermatitis sufferers and at least one of two broad groups of controls; dermatological disorders considered to be unaffected by psychological factors, and nondermatological controls. This second category was not restricted to normal healthy controls; nondermatological or psychoneurotic patients were also included in this category. Use of these two broad categories allowed the issue of what variables differentiate atopic dermatitis sufferers from nondermatological subjects as well as those that separate atopic dermatitis sufferers from other dermatological cases to be investigated. If a variable was found to differentiate atopic dermatitis sufferers from the first group, but not the second, it may indicate that the variable is associated with dermatological disorders in general. The third criteria for inclusion in the meta-analytic review was that the study must provide quantifiable descriptions of differences between the groups on the particular variables. Last, sufficient information to determine an effect size and significance level was required. This may be provided by report of various statistical tests or obtained through calculations based on reported means and standard deviations. A total of 15 studies met these criteria. These studies, the groups compared, and the variables investigated are shown in Table 8.

### *Variables included in the analysis*

For a variable to be included in the meta-analysis, at least four studies that met the criteria listed must have examined that variable. On this basis, the variables anxiety, depression, suppressed hostility and anger, neuroticism and extraversion were selected for investigation through meta-analysis. There were insufficient studies to allow a meta-analysis of studies comparing atopic dermatitis sufferers and dermatological controls for the variables extraversion, neuroticism, and depression. Therefore, comparisons between these groups were limited to anxiety, and suppressed anger and hostility. In their review, H. Friedman and Booth-Kewley examined the constellations anger/ hostility and anger/ hostility / aggression. Studies of atopic dermatitis sufferers have frequently identified suppression of anger and hostility as a feature of their presentation. Therefore, this variable was examined rather than the broader category investigated by H. Friedman and Booth-Kewley. Neuroticism was included as it has also been frequently identified as a feature of atopic dermatitis sufferers.

Table 8

*Studies Used in Meta-analysis, Groups Compared, and Variables Examined*

Study	Groups	Variables
Al-Ahmar & Kurbin (1976)	AD, DC, NC	Anxiety, Depression, Neuroticism, Extraversion
Cleveland & Fisher (1956)	ND, NC	Hostility
Endicott (1965)	ND, DC, NC	Anxiety, Depression, Hostility
Faulstich et al. (1985)	AD, NC	Anxiety, Depression
Fiske & Obermayer (1954)	AD, NC	Hostility
Garrie et al. (1974)	AD, DC, NC	Anxiety
Greenhill & Finesinger (1942)	AD, DC, NC	Anxiety, Depression, Hostility
Jordan & Whitlock (1972)	AD, NC	Anxiety, Hostility, Neuroticism, Extraversion
Klaber (1960)	ND, DC	Hostility
Levy (1952)	ND, DC	Hostility
Rabin & Kepecs (1954)	AD, NC	Hostility
Sainsbury (1960)	AD, NC	Extraversion, Neuroticism
Seitz et al. (1953)	ND, DC	Hostility
Tantum et al. (1982)	AD, NC	Neuroticism, Extraversion
Ullman et al. (1977)	AD, NC	Depression, Hostility

*Note.* AD = Atopic dermatitis, ND = Neurodermatitis, DC = Dermatological controls, NC = Nondermatological controls.

### *Measures utilised in assessment of variables*

Anxiety was assessed in the included studies by the following measures and scales: Spielberger State-Trait Anxiety Scale- Trait Scale, the Taylor Manifest Anxiety Scale, Welsh's Additional MMPI Anxiety Scale, Symptom Checklist 90 Revised- Anxiety scale, the Anxiety scale of an unspecified self-report questionnaire, and anxiety-related items of a questionnaire constructed by Greenhill and Finesinger (1942).

Neuroticism was assessed by the following measures: Neuroticism scale of the Eysenck Personality Inventory, and the Neuroticism scale of Maudsley Personality Inventory. Extraversion was assessed by the following measures: Extraversion scale of the Eysenck Personality Inventory, and the Extraversion scale of Maudsley Personality Inventory. Depression was assessed by the following measures: the MMPI- Depression scale, the Symptom Checklist 90 Revised- Depression scale, the Depression scale of an unspecified self-report questionnaire, and depression-related items on a questionnaire constructed by Greenhill and Finesinger (1942).

Suppressed anger and hostility was assessed by the following measures: Factor I (Hostility) of the Buss-Durkee Hostility Inventory, ratings of hostility made on the basis of responses to the Thematic Apperception Test (TAT), ratings of hostility made on the basis of use and amount of white space responses to the Rorschach Inkblot Test, ratings of hostility made on the basis of Content scores on the Rorschach, the Intropunitive scale of the Rosenzweig Picture Frustration (P-F) study, ratings made on the basis of responses to a battery of tests including the TAT, Rorschach, Draw-A-Person, and Shipley-Hartford, ratings of appropriate handling of anger made on the basis of responses to a clinical interview, the Covert Hostility scale of an unspecified self-report questionnaire, and hostility-related items on a questionnaire constructed by Greenhill and Finesinger (1942).

### *Meta-analytic techniques utilised*

Like H. Friedman and Booth-Kewley (1987), the product moment correlation coefficient ( $r$ ) was utilised as the effect size estimate. Statistical analyses (e.g.,  $F$  tests,  $t$ -tests, chi-squared) reported by studies were converted to  $r$ . This was achieved through the use of transformation formula described in Glass et al. (1981). In the case of chi-squared analyses, the formula for the coefficient Phi was utilised in preference of Pearson's coefficient of contingency. This was due to the fact that the latter measure can be inaccurate for cases with low numbers of categories (Glass et al., 1981). When Tukey tests and Fisher's Least Significant Differences were listed as tests of planned comparisons,  $t$ -test values of equivalent significance levels were utilised to determine effect sizes. This was considered appropriate as both of these

tests are conceptually related to the  $t$ -test. Use of  $t$ -test values provides a conservative estimate of the effect size determined by these tests. Sign test data were converted to a chi-squared as it is conceptually related. When statistical tests were not reported but means and standard deviations were provided, appropriate statistics were calculated. Unlike H. Friedman and Booth-Kewley (1987), though, obtained  $r$  values were not converted to Fisher's  $Z$  coefficients before summing. This is because Glass et al. (1981) pointed out there was no reason why it was necessary to transform  $r_{xy}$  to Fisher's  $Z$  for the purpose of aggregation and analysis. Therefore, obtained  $r$  values were averaged directly.

The Stouffer method (Mosteller & Bush, cited in Cooper, 1979) of adding standard normal deviate  $Z$  s was used to combine the significance levels was used. This method was utilised as it was that followed by H. Friedman and Booth-Kewley (1987). As it was also used in the two diary studies reported in earlier chapters, it provided a consistent approach. Following H. Friedman and Booth-Kewley (1987), a fail safe  $N$  (Rosenthal, 1984) was calculated for each analysis. The fail safe  $N$  provides an estimate of the number of unpublished, nonsignificant findings that would be required in order to render the probability value determined in each Stouffer analysis nonsignificant.

#### *Results of the meta-analyses*

The obtained combined  $r$  values (effect sizes), and the  $Z$  scores, corresponding probability levels, and fail safe  $N$  for each Stouffer analysis are presented in Table 9. According to the meta-analyses, atopic dermatitis sufferers score more highly on measures of anxiety, depression, neuroticism, and suppressed anger and hostility than nondermatological controls. No differences exist between the groups with regard to extraversion. According to the meta-analyses, the atopic dermatitis sufferers also score more highly on measures of anxiety and suppressed anger and hostility than dermatological control groups. Such a result suggests these factors are not raised in atopic dermatitis merely as a consequence of suffering a skin disorder. The results are consistent with the conclusions of the literature review presented in this chapter.

The results are also consistent with those obtained by H. Friedman and Booth-Kewley (1987) on the relationship between anxiety, depression, and anger and hostility and the disorders examined in their meta-analyses. A direct comparison between the results of the current meta-analyses and those of H. Friedman and Booth-Kewley is not possible because of the absence of aggression as a variable in the current study and neuroticism in the other study. However, with this limitation kept in mind it is possible to state that the atopic dermatitis sufferers show similarities to the coronary heart disease patients who showed elevations on depression, anxiety, anger, hostility, aggression, and extraversion and the asthma sufferers who show a similar pattern with the exception that they tend to be introverted. This similarity between the



Table 9  
*Results of Meta-analyses*

Comparisons between atopic dermatitis sufferers and nondermatological controls					
Variable	Combined $r$	No. of articles	$Z$	$p$	Fail safe $N$
Anxiety	.33	6	4.96	< .0001	48
Depression	.34	5	3.74	< .0002	24
Extraversion	.10	4	1.66	< .0969	0
Neuroticism	.40	4	5.34	< .0001	38
Hostility	.35	7	6.22	< .0001	93
Comparisons between atopic dermatitis sufferers and dermatological controls					
Variable	Combined $r$	No. of articles	$Z$	$p$	Fail safe $N$
Anxiety	.23	4	2.95	< .0032	9
Hostility	.25	5	4.82	< .0001	38

various patient groups provides further support for the concept of a disease-prone personality rather than specific personality profiles being associated with specific disorders.

This is not to say that the results of the meta-analyses cannot be subject to criticism. First, the studies included represent only a proportion of the large number of studies conducted on the topic of the association between personality and emotional factors and atopic dermatitis. Second, the meta-analyses are limited by the quality of the original studies themselves. The atopic dermatitis group often included other disorders under the broad name of neurodermatitis, subject numbers were low, and the control groups were diverse. These factors have been discussed above and will not be repeated here.

In summary, the results of the meta-analyses and the literature review suggest that specific personality features and emotional states are associated with atopic dermatitis. However, the studies conducted so far on this topic are mostly flawed. Therefore, a study that attempted to address these issues without repeating the flaws present in the previous studies would not constitute a unwarranted repetition. A study that attempts to achieve this is described in the next chapter.

**CHAPTER 5**  
**PERSONALITY FACTORS AND EMOTIONAL STATES**  
**IN ATOPIC DERMATITIS.**

Given the review in the previous chapter of studies investigating the role of personality in atopic dermatitis, it may appear that further studies on this topic would be pointless. The concept of a specific constellation of personality traits, or unconscious emotional conflicts being linked to the skin disorder in a single causal role has been rejected. This is not due solely to the inability of researchers to find evidence of such a specific constellation, or to provide a pathway by which it created the symptoms of the disorder. Developments in knowledge regarding the influence of genetic, immunological, physiological, pharmacological and other factors described in chapter 1 on the expression of the disorder, as well as the emergence of the multifactorial biopsychosocial perspective of disease (G. Engel, 1977) and psychosomatic medicine (Lipowski, 1977) were important factors.

The findings from the field of psychoneuroimmunology reviewed in chapter 1 suggest potential pathways by which emotional stress may lead to exacerbations of the skin disorder. Studies have shown that interventions to reduce stress levels such as relaxation therapy (e.g., Haynes et al., 1979; Horne et al., 1989) and psychotherapy (e.g., Brown & Bettley, 1971; Schoenberg & Carr, 1963) have led to significant improvements. Evidence for the role of stress was provided in the diary study described in the second chapter. Learning theory-based studies reviewed in chapter 1 have also provided evidence for their role in symptom exacerbation and maintenance (e.g., Gil et al., 1988; Jordan & Whitlock, 1972). Behaviour therapy interventions targeted to scratching have led to significant improvements (e.g., Cole et al., 1988; Melin et al., 1986). The findings of these studies provide a strong argument for the inclusion of stress and emotional factors and learned behaviour as determinants of the course of atopic dermatitis. Are personality factors still relevant to the multifactorial perspective?

#### *Resurgence of interest in personality*

##### *The failure of the non-specific approach*

In recent years, there has been a resurgence in interest in the role that personality may play in the development and maintenance of disease. There are a number of developments that have contributed to this. First, the failure of the specificity theories of psychosomatic disorders led to the development of the non-specific approach to illness. Processes were sought to explain susceptibility to illness in general, rather than specific diseases. The psychological focus was on the impact of situational variables such as life events (Holmes & Rahe, 1967). According to Suls and Rittenhouse (1987), the life events approach implicitly drew on Selye's (1956) concept of stress as a non-specific bodily response to explain the relationship between life change and illness. Constitutional, genetic, environmental and other factors were thought to determine the specific disorder experienced (Holroyd & Coyne, 1987). These studies rarely obtained correlations

between life events and illness onset of higher than .30 (Rabkin & Struening, 1974) and failed to explain why some individuals became ill when others did not, and why different people became sick with different diseases. Furthermore, the research of Depue and Monroe (1986) indicated that some individuals were prone to certain illnesses. This suggested that mediating factors such as personality must be operating (Suls & Rittenhouse, 1987).

*Personality as a moderator variable*

There has been research on variables that may moderate the relationship between stressors and health. Early research indicated that people high in social conformity were less at risk for increases in reported illness after life stress, while those high in liberal intellectualism and emotional sensitivity were more at risk (Garritty, Somes, & Marx, 1977). Burchfield, Holmes, and Harrington (1981) found that rarely sick individuals reported higher satisfaction, and lower frustration and worry. Valliant (1978) followed a group of men over a 35 year period and examined which men developed psychosomatic illnesses. Interview and questionnaire data collected over the period of the study was examined for evidence of particular personality features. Valliant (1978) found that those men who suffered from psychosomatic illness showed twice the number of episodes that reflected the traits of an "oral dependent" personality; dependency, pessimism, self-doubt, and passivity. Hysterical and obsessive-compulsive individuals were evenly represented in both groups.

The personality style known as hardiness (Kobasa, 1979) has been subjected to the most research. Hardy personalities consist of three components: a sense of commitment to work and self, a tendency to see change as a challenge, and a sense of an internal locus of control. In her initial investigation, Kobasa (1979) found that executives who scored highly on these constructs suffered less illness than executives who scored low on these constructs when under high levels of stress. Later prospective studies (Kobasa, Maddi, & Courington, 1981; Kobasa, Maddi, & Kahn, 1982) have demonstrated that hardiness predicts concurrent and future health. A recent prospective study found that hardiness predicted less psychosomatic symptoms (Banks & Gannon, 1988). Kobasa (1979) originally perceived hardiness as exerting its effect through a buffering role; the hardy person reduced the impact of stressful events by increased use of social resources and effective coping strategies. Later Kobasa (1982) conceived hardiness as directly reducing strain through the commitment component, as well as indirectly by the reduced use of unsuccessful coping strategies.

A recent critique of the link between hardiness and health by Hull, Treuren, and Virnelli (1987) made major criticisms of the concept of hardiness. First, they found that of the three components of hardiness, only commitment and control

were related to health outcome. Second, they showed that despite being correlated, commitment and control both exerted independent effects on health outcome. This argued against a unitary concept of hardiness, as this would have predicted that the two variables overlap in accounting for variance in stress responses, and that one variable is effective only in the presence of another. Third, they criticised many of the studies as reporting the relation between hardiness and self-reported health, rather than actual health. Finally, they state that evidence supports a direct effect of hardiness or, at least, the commitment and control components to self-reported health but there is only slight evidence of a buffering role. Despite the fact that the status of hardiness is uncertain, it has helped to rekindle interest in the link between personality and health.

#### *Type A personality*

Another reason for a resurgence of interest in the role of personality factors in illness was the accumulation of a large body of evidence concerning the increased risk of coronary heart disease and the Type A behaviour pattern (M. Friedman & Rosenman, 1974). Although often mistakenly referred to as "Type A personality" (e.g., H. Friedman & Booth-Kewley, 1987), it is actually a complex pattern of attitudes and behaviours that is manifested as a striving for achievement, a sense of time urgency, impatience, irritability, competitiveness, and excess of drive and hostility. This is directed toward gaining and maintaining control and mastery over challenging and threatening environments (Dorian & Taylor, 1984; Rimé, Ucross, Bestgen, & Jeanjean, 1989). Reviews (Jenkins, 1976; Manuck, Kaplan, & Matthews, 1986) and a meta-analytic review (Booth-Kewley & Friedman, 1987) have found overwhelming support for the link between Type A behaviour and increased morbidity and mortality from coronary heart disease. Recent attention has turned to the central role of one of the components, hostility, in increasing the risk (Chesney & Rosenham, 1985; Koskenvuo et al., 1988; Leiker & Hailey, 1988). This has provided support for a role for personality factors in illness.

#### *The disease-prone personality*

In contrast to this specific approach is the concept of the disease-prone personality. In the absence of evidence to suggest clear links between specific patterns of psychological processes such as personality traits and specific patterns of physiological reactions that lead to specific diseases, the concept of a general disease-prone personality has been put forward. H. Friedman and Booth-Kewley's (1987) meta-analytic study described in the previous chapter found some support for this concept. A recent study which investigated the issue of the disease-prone personality was that by Rimé et al. (1989). They assessed the presence of Type A behaviour and self-reported of illnesses such as coronary heart

disease, scarlet fever, asthma, liver disease, peptic ulcer, renal disease and so on in 1949 adults. Type A patients reported not only more coronary heart disease, but also more rheumatoid arthritis, peptic ulcers, asthma, and thyroid problems. Despite the fact that four of the five diseases were psychosomatic-type diseases, further analysis revealed that they reported more illnesses that were non-psychosomatic as well. The possibility that the self-report of illness reflected a disposition to report symptoms was discounted by the authors due to the fact that illnesses rather than symptoms were assessed and that previous research had indicated that Type A people were more likely to deny physical symptoms. They conclude that the results of their study are consistent with those of H. Friedman and Booth-Kewley (1987) and that the Type A behaviour pattern may represent another facet of a general disease-prone personality.

*Personality and the transactional approach*

The resurgence of interest in the relationship between personality variables and illness was also helped by the advancement of conceptual models that attempted to explain the link between life events, stress, and physical disorder more adequately than the life events approach (Suls & Rittenhouse, 1987). Such a conceptual model was the transactional model of Lazarus and associates (Folkman & Lazarus, 1980; Lazarus & Folkman, 1984). As described in chapter 2, the Lazarus model included personality variables as important factors in the person-environment transaction. The impact of personality variables on adaptational outcomes was seen to be mediated through the appraisal process of the model, affecting both the appraisal of stakes and the appraisal of coping. Its effect, therefore, is mediated cognitively (Holroyd & Lazarus, 1982). With regard to appraisal of stakes, generalised beliefs about oneself and the environment, such as a view of oneself as dependent, may predispose an individual to perceive certain events such as a loss as threatening. Alternatively, such variables may operate more generally, leading the person to view many situations as threatening (Depue, Monroe, & Shackman, 1979). On the other hand, appraisal of a situation as a challenge, involves the concept of positive control or mastery. Those individuals who perceive themselves as having high degrees of control will be more likely to appraise a situation as challenging rather than as a threat.

Appraisal of coping is thought to be influenced by previous experience, beliefs about oneself and the environment, the availability of personal resources such as problem-solving skills, and environmental resources, such as social support (Holroyd & Lazarus, 1982). The potential role of personality factors is clear. Particular personality traits may lead to an individual selecting certain coping strategies or having differential access to others. Holroyd and Lazarus (1982) state that the appraisal of stakes and of coping are highly interdependent and not easily

separable. Therefore, it is possible that specific personality features may affect both appraisal of stakes and appraisal of coping. For example, when faced with a particular situation, a person high in mastery may appraise the situation as challenging and capable of being changed, and therefore select more problem-focused coping strategies than someone low in mastery who may perceive the situation as threatening, and select emotion-focused coping strategies (Fleishman, 1984).

It is clear that personality interacts with appraisal and coping processes in a complex manner. A number of studies have examined how particular personality features influence these processes. Fleishman (1984) found high levels of self-denial was associated with greater use of selective ignoring, irrespective of the role area. Self-deniers also tended to use related emotion-focused coping strategies, such as resignation and self-reassurance in parenthood, and passive acceptance in marriage. This was the closest to an emotion-focused coping style. Non-disclosers of problems tended to seek less advice from others for dealing with marital and parental role areas as well as using more passive acceptance in marriage, and less direct action at work. Increased levels of mastery led to greater use of problem-focused coping in areas of work and finance but not in the interpersonal realm. It did not affect advice seeking in marriage and parenthood. People high in mastery, as expected, used selective ignoring and related emotion-focused coping strategies. Situational factors appeared to be more important than personality factors in determining coping strategy (Fleishman, 1984).

Folkman, Lazarus, Gruen, et al. (1986) examined the role of personality on the stability in primary and secondary appraisal coping processes in a number of stressful situations. They found that use of problem-focused coping showed the least consistency across a six month period and a range of stressful situations. This suggested that problem-focused coping was influenced greatly by the situational context. The emotion-focused coping strategy of positive reappraisal displayed the greatest consistency, suggesting it was more influenced by personality factors. Primary and secondary appraisal processes displayed low autocorrelations across the time and situation, suggesting they were influenced by situational factors more than personality. The personality variables of mastery and interpersonal trust, appraisal of stakes and coping, and actual coping did not predict somatic health outcome when entered in a regression analysis. This was due to the low correlations between the variables, suggesting that there was no consistent pattern of effect of personality on appraisal and coping.



With regard to psychological symptoms, regression analyses indicated that mastery and interpersonal trust and appraisal and coping processes have a significant relationship to psychological symptoms. A sense of mastery, and higher levels of interpersonal trust were associated with lower levels of psychological symptoms. In contrast to Folkman, Lazarus, Gruen et al.'s (1986) assertion that personality factors played a mediating role through their effect on appraisal and coping processes (a view that differs from Lazarus' earlier assertion in the 1982 paper by Holroyd and Lazarus that they operated through appraisal processes alone), mastery and interpersonal trust were found to affect psychological health independently of these processes. This left the mechanism of their effect on psychological symptoms unclear and their role in somatic health outcomes uncertain (Folkman, Lazarus, Gruen et al., 1986).

More recently, a 1989 Dutch study by Van Heck and Vingerhoets (cited in Vingerhoets & Van Heck, 1990) found that neurotic, socially inadequate, rigid and hostile individuals, and to a lesser extent people who were highly self-sufficient, tended to use more covert, emotion-focused activities. Dominant and optimistic people who had a high self-esteem, on the other hand, used more problem-focused coping.

#### *Methodological criticisms of previous research*

The review of the personality studies in the previous chapter indicated that nearly all studies were methodologically flawed in some way. These flaws can be categorised into flaws of subject selection, appropriate control group selection, and appropriate assessment strategies.

##### *Subject selection flaws*

With regard to subjects used in previous studies, a major criticism was the selection of an inappropriate experimental group. Confusion over terminology, particularly neurodermatitis and eczema, led to inconsistency in subjects studied. Comparison between studies becomes difficult when neurodermatitis refers to atopic dermatitis in one study and a number of disorders in another. The selection criteria of the atopic dermatitis subjects is also a major issue. Use of biased samples such as dermatology inpatients, or "difficult" cases who had been referred to a psychiatrist because of obvious emotional or personality difficulties clearly limits interpretation of a study. How representative are these subjects of the average atopic dermatitis sufferer, and what is the connection, if any, between the emotional factors and the dermatitis in the latter case? Are they connected or this a person who has psychiatric problems, and also has a skin disorder? Finally, many of the studies reviewed relied on small numbers of subjects on which to make generalisations about the larger population of atopic dermatitis sufferers.

### *Flaws regarding control groups*

In many of the studies reviewed in chapter 4, no control groups were utilised. This was particularly true of those studies that were reviewed under the sections concerned with the personality profile studies and the projective test studies. However, a number of specific test studies relied on comparison with published norms rather than a control group. Both procedures are inadequate if meaningful interpretations are to be made. However, the selection of an appropriate control group is not straightforward. If normal, healthy subjects are used, it is impossible to state whether any observed differences are associated with atopic dermatitis, a skin disorder, an itching disorder, a cosmetic disfigurement, or a chronic disorder (Rostenberg, 1959). Many researchers have realised this and included a control group comprising skin disorders in which psychological factors were thought not to play a part in aetiology or maintenance. This allowed any similarities between the groups to be regarded as reactions to the disorder. The skin disorder selected should be of comparable duration, extent, and visibility to atopic dermatitis, rather than of acute onset, circumscribed extent and affecting nonvisible areas. Many studies have used skin disorders that are of recent onset or highly localised in their bodily distribution. Whether such a control group should be comprised of a single disorder or a number is debatable.

### *Flaws in assessment*

The use of blind study designs for the assessment of personality features is of central importance. Yet, in many of the studies assessment was not blind; often experimenters who were aware of the study's hypothesis assessed patients whose diagnosis was known to them. Unfortunately, this was particularly true of studies that relied on projective tests whose interpretation is more subjective and, therefore, need blind designs. Study designs that incorporate testing conditions which leave the assessor/ scorer of data blind to the diagnoses of the subject are preferable.

Many previous studies have been flawed due to their utilisation of unreliable or invalid assessment devices. This is particularly relevant to those studies that employed projective techniques like the Rorschach which have been criticised by authors such as Anastasi (1982). Whitlock (1976) also criticised the use of tests that assessed global personality features such as the MMPI, rather than the use of tests specifically designed and validated to measure specific features such as hostility, or dependency.

Researchers in the past have failed to distinguish between assessment of enduring personality traits and emotional states such as anxiety that are subject to fluctuation. When atopic dermatitis sufferers are reported to be more anxious, it is

often difficult to decide if this refers to a trait disposition to be anxious or a current temporary state of anxiety. While both are worthy of study, the researcher needs to be clear as to what he is studying.

*Overcoming past methodological flaws*

From the mentioned methodological flaws, it is obvious that an acceptable study would compare an adequately large number of purely atopic dermatitis sufferers, selected such that they resembled as nonbiased a sample of sufferers as possible. An appropriate control group in such a study would be comprised of subjects with a skin disorder that was of similar duration, have equally visible lesions, and extent of bodily distribution to atopic dermatitis. However, psychological factors such as stress must not affect its course or presentation. A matched group of skin disorder-free controls would allow further comparison. All three groups need to be administered assessment devices that have been shown to be reliable and valid measures of specific personality features or emotional states. The administration conditions should be the same for all subjects. Finally, the design of the study should be such that assessment and/ or scoring is blind to group membership.

Holroyd and Coyne (1987) also suggest that studies should examine the interrelationships between the independent variables, the assessment devices. This is because an observed relationship between a personality trait and a disorder such as atopic dermatitis may be a result of that trait's third-factor association with another personality trait. This has been a serious failing in previous research on atopic dermatitis. Jordan and Whitlock (1972, 1974) demonstrated that observed differences between atopics and a control group on hostility and neuroticism disappeared when the groups were matched on anxiety. Similarly, Liakos et al. (1977) found that intrapunitive hostility was associated with state and trait anxiety in neurotics. Therefore, the relationships between variables such as neuroticism, anxiety, and hostility need to be examined as part of any investigation.

Studies by D. G. Brown (1967, 1972) and others (Kalz et al., 1954; Kepecs, Rabin, and Robin, 1951; Kuypers, 1968; Whittkower & Edgell, 1951) reviewed in the previous chapter had attempted to divide eczema or atopic dermatitis sufferers into groups on the basis of observations of their personality structure. A new study on atopic dermatitis sufferers would have an opportunity to test the validity of these observations using valid and reliable measures. In particular, it would be possible to test the applicability of D. G. Brown's (1967, 1972) observations on eczema sufferers which had incorporated results from the EPI on a group composed solely of atopic dermatitis sufferers.

### *Selection of assessment devices*

In selecting the appropriate personality factors to investigate in atopic dermatitis sufferers, and the appropriate tests with which to assess them, four points needed to be considered. First, the results of the literature review and meta-analysis reported in the previous chapter indicated a number of personality factors and emotional states that were consistently associated with atopic dermatitis. These were: neuroticism; anxiety; depression; and hostility, especially suppressed hostility. Therefore, any new study should attempt to incorporate these features as variables to investigate.

Second, research by Jordan and Whitlock (1972, 1974) and Liakos et al. (1977) as well as comments by Costa and McCrae (1987) and Holroyd and Coyne (1987) indicate the need to be aware of the interrelationships between personality factors and emotional states. This is particularly true of the links between self-reports of neuroticism, anxiety, and intrapunitive hostility. Similarly, links exist between depression and dependency (Blatt, Quinlan, Chevron, McDonald, & Zuroff, 1982). Previous researchers have largely ignored this; a new study should attempt to investigate these interrelationships.

Third, research has indicated the relevance of personality variables that have not received consideration in previous studies. For example, the research of Kobasa (1979), Lazarus (Folkman, Lazarus, Gruen et al., 1986) and Fleishman (1984) have identified locus of control or mastery as an important personality dimension in determining health outcomes. The effect of social desirability on reporting styles has also received attention in recent years. There has been considerable debate over whether social desirability is a response style that is to be corrected for (e.g., Paulhus, 1981) or an actual aspect of personality structure (e.g., McCrae & Costa, 1983). For this reason, social desirability is a dimension worthy of inclusion in any new study.

Last, as stated previously, previous research has been flawed by the use of assessment devices of suspect reliability and validity. There is considerable debate about which device is the most valid and reliable measure of almost every dimension of personality or emotional state. Any new study should attempt to utilise those devices that appear to offer both adequate reliable and valid assessment of the relevant dimension.

### *The current study*

The aim of this experiment was to investigate the association between certain personality factors and emotional states, and atopic dermatitis, while avoiding the methodological limitations of previous research. A number of specific hypotheses were proposed.

First, it was hypothesised that two distinct subgroups of the atopic dermatitis sufferers exist. One group was hypothesised to resemble those subjects referred to by Kepecs, Rabin, and Robin (1951) as Rigid, Kalz et al. (1954) as Restrained, and D. G. Brown (1967, 1972) as Superstable. Subjects classified as such by these authors have been characterised as displaying a suppression or denial of strong emotion. They report less anxiety, depression, and less dependency needs. They also report displaying less aggression towards others, tending instead to deny aggressive feelings. D. G. Brown (1967, 1972) found that this type of subject tended to deny the role of stress in affecting the course of their skin complaint. Consistent with their tendency to suppress emotions, he found that their neuroticism scores were low. From what has been written previously in regard to the interrelationships between neuroticism and these other variables, the low neuroticism score is possibly the pivotal feature of this group. Based on the findings of D. G. Brown (1967, 1972) regarding the proportion of eczema subjects in his study displaying this pattern, approximately one-third of the atopic dermatitis subjects in the current study were predicted to show a similar pattern. The second subgroup is hypothesised to resemble the Emotionally Labile group of Kepecs, Rabin, and Robin (1951), the Free group of Kalz et al. (1954), and the Unstable group of D. G. Brown (1967, 1972). Subjects categorised as belonging to this type have been characterised as having high neuroticism scores and high levels of anxiety, depression, and dependency. In contrast to the first subgroup, they do not deny their hostile feelings, but direct them inwards. Again, based on D. G. Brown's (1967, 1972) findings, approximately two-thirds of the atopic dermatitis sufferers were predicted to show this pattern.

The second set of hypotheses proposed refer to the comparison of the atopic group to the skin-disorder free controls. The literature review and meta-analyses of the personality studies reported in the previous chapter found that atopic dermatitis sufferers scored higher than normal controls on measures on neuroticism, state and trait anxiety, depression, and dependency. It also suggests that rather than expressing anger or hostility, atopic dermatitis sufferers tend to suppress these feelings, turning them in on themselves. This pattern is similar to that of the second subgroup of atopic dermatitis sufferers described in the preceding paragraph. It is possible that this subgroup of atopic dermatitis sufferers are more likely to seek medical help for their skin condition. This is consistent with the research of Costa and McCrae (1987) who suggested that individuals who score high on neuroticism are more likely to report symptoms and to seek out medical advice. As previous studies often included individuals selected from patients of dermatologists and outpatient departments, a biased sample is likely to have resulted. An alternative explanation is provided by the study by D. G. Brown

(1972). He found that the greater preponderance of Unstable subjects in his study tended to affect the results of comparisons between the eczema group and the dental controls. Given the set of hypotheses regarding the existence of subtypes of atopic dermatitis sufferers, predictions regarding differences between atopic dermatitis sufferers and skin-disorder free controls are dependent on atopic dermatitis subgroup membership. Therefore, it is hypothesised the second subgroup of atopic dermatitis subjects; if such a subgroup is found to exist; will differ from the skin-disorder free controls by reporting more neuroticism, state and trait anxiety, depression, dependency, and inwardly directed hostility. The first subgroup of atopic dermatitis sufferers are hypothesised to report lower levels of neuroticism than skin-disorder free controls, and to deny the existence of hostile feelings.

It was further hypothesised that the atopic dermatitis and normal control groups would not differ with regard to extraversion. This is consistent with the finding that of seven studies examining this factor, only one (Sainsbury, 1960) involving a large sample found evidence that neurodermatitis sufferers were more introverted. D. G. Brown (1967) found that his eczema sufferers scored significantly higher on the Lie scale of the EPI than the published normal group norms. Other studies utilising the EPI or MPI (Jordan & Whitlock, 1972; Kenyon, 1962; Sainsbury, 1960) did not report such a finding. It was therefore hypothesised that the atopic dermatitis sufferers would not display higher Lie scores than the normal controls. Because the Lie scale measures a "desirability response set" (Eysenck & Eysenck, 1964, p. 5), it was hypothesised that the groups would not differ with regard to scores on a measure of social desirability. Finally, as other psychosomatic groups have been reported to have a more external locus of control, it was hypothesised that the atopic dermatitis group would report a more external locus of control than the normal controls.

Research reviewed in the previous chapter indicates that atopic dermatitis sufferers differ from skin-disorder control groups by scoring more highly on neuroticism (Al-Ahmar & Kurban, 1976), and state and trait anxiety (Endicott, 1965; Garrie et al., 1974). They also display more suppression of hostility (Endicott, 1965; Greenhill & Finesinger, 1942; Klaber, 1960). With regard to depression, one study (Al-Ahmar & Kurban, 1976) found atopic dermatitis sufferers to be more depressed than a skin-disorder control group, while Endicott (1965) did not find this to be the case. As with the comparisons between atopic dermatitis sufferers and normal controls, these differences are consistent with the characteristics of the Free/ Emotionally Labile/ Unstable subgroup of atopic dermatitis or eczema sufferers. Therefore, it was hypothesised that this subgroup would show greater levels of neuroticism, anxiety, and suppression of hostility

than the skin-disorder controls. Because of the reported association of depression with atopic disorders (e.g., A. Allen, 1989; Nasr et al., 1981), it was hypothesised that this subgroup would score more highly on depression than the skin-disorder group. Finally, it was predicted that they would also score more highly on dependency, because of this factor's association with neuroticism (Hirschfield et al., 1977) and depression (Blatt et al., 1982). No differences were predicted with regard to extraversion or social desirability. It was predicted the Rigid/ Restrained/ Superstable subgroup would score lower on neuroticism than the skin-disorder group and show a greater tendency to deny hostile feelings. The skin-disorder control group was hypothesised to not differ from the normal controls on any of the measures.

As previously stated in this chapter, one aim of this experiment was to investigate the interrelationships between the various measures. The associations between neuroticism and report of anxiety, depression, dependency, and intrapunitive hostility and between depression and dependency have previously been outlined. Interrelationships between these factors have not been previously described in studies involving atopic dermatitis. It is predicted that report of anxiety, and depression, as well as intrapunitive hostility will be associated with level of neuroticism. Dependency is predicted to be associated with level of depression.

## Method

### *Subjects*

#### *Atopic dermatitis subjects*

Fifty-five atopic dermatitis sufferers, 36 females and 19 males, were contacted through a variety of sources. First, seven were patients of two dermatologists approached for subjects, seven were patients of the university's medical clinic, and two were patients of a private general practitioner. Nine were university students who responded to advertisements in a daily bulletin for volunteers. The remaining 30 were members of the general community residing throughout the state of Tasmania who responded to requests for subjects in radio and television interviews and articles in three newspapers. Volunteers who were not referred from a medical practitioner were interviewed as to the history of their disorder, its bodily distribution, association with other atopic disorders (asthma, hayfever) and treatments used as well as presence of a family history of atopy. Those volunteers whose diagnosis was uncertain were excluded.

All subjects completed the subject information sheet contained in Appendix 2. From this sheet, details regarding the age of the subject and history of the disorder were obtained. The mean age of the subjects was 30.2 years (standard deviation [ $SD$ ] = 10.7). While 22 of the subjects reported onset at birth or in the first months of life, many reported an onset in later years. The mean onset age was 7.1 years ( $SD$  = 11.3), and mean duration was 21.1 years ( $SD$  = 13.2). Fifty-four percent of subjects reported a family history of the disorder. With regard to the related atopic disorders, 38 % had suffered from asthma, 53 % from hayfever, and 11 % from hives or urticaria. Rajka (1975) indicated that about three percent of atopic dermatitis cases also suffer from ichthyosis vulgaris, but notes that its diagnosis is made with varying vigour. Only one volunteer was able to clearly state that he suffered from both disorders concurrently and he was excluded.

A wide variety of treatments had been used by the subjects. Corticosteroid cream had been used by all subjects, antihistamines by 50 %, cortisol injections by 22 %, desensitisation injections by 13 %, sedatives by 25 %, relaxation by 13 %, hypnosis by 9 %, cortisol tablets by 15 %, restrictive diets by 15 %, and herbal and algal treatments by 5 %.

As described in chapter 4, D. G. Brown (1967, 1972) divided his eczema sufferers into subgroups. One distinguishing factor was that 82 % of the Unstable subjects believed stress affected their eczema while only 29 % of the Superstable group felt that this was true. As the two groups differed on other dimensions relevant to the current study, the issue of stress involvement appeared to be a meaningful distinction to make. The subject information sheet contained two questions regarding the influence of stress on the skin symptoms. The first concerned the onset of the disorder and asked, "Was this outbreak related to some



important event ? (e.g., change of school, moving house, etc.)" The second referred to subsequent outbreaks and asked, "Have any of these times been due to stressful events ?" on the basis of their answers to these two questions, 13 subjects (26 %) stated they did not believe that stress affected their atopic dermatitis. They were called the "nonstress atopic group" (NSA). They differed from the 42 (74 %) subjects who believed that stress did have an effect on their skin disorder (the "stress atopic group"[SA]) by being slightly older (34.1 to 28.9 years), older at onset (12.0 years compared to 5.76) and less likely to report a family history of the disorder (46 % to 57 %). Duration of the disorder was the same for both groups (21.0 and 21.25 years).

#### *Skin-disorder control group*

Twenty-three subjects, 10 females and 13 males, suffering from ichthyosis (ICH) or "fish scale disease" were selected as a comparison group. Ichthyosis is a disorder of keratinization that is characterised by dry and scaly skin. While 13 clinical syndromes have been described, the two most common forms are dominant ichthyosis vulgaris and sex-linked ichthyosis vulgaris. The first is determined by an autosomal dominant gene and has an incidence of about 1 in 300 people. It first appears between the ages of 1 and 4 years, the scales are small, white, and translucent. The arms and legs are mainly affected, and there is usually improvement in the summer. Atopic disorders tend to be associated with this form of ichthyosis (Ebling & Rook, 1979). Sex-linked ichthyosis is rarer, occurring in 1 in 6000 males. As the name suggests, it is inherited through a sex-linked recessive gene. It appears in early infancy and is characterised by large yellow, brown, or almost black scales which can cover the entire body. The area in front of the ears and the scalp can be affected as well. There is no association with atopy in this form of ichthyosis (Ebling & Rook, 1979). Ichthyosis was chosen as a control group because its occurrence at birth or early childhood, and because the distribution of the disorder and visibility make it comparable to atopic dermatitis.

Four of the ichthyosis subjects were recruited through dermatologists or medical practitioners; the rest were recruited through a radio interview and advertisements in two newspapers. As with the atopic dermatitis sufferers, they lived throughout the state of Tasmania. The ichthyosis subjects also completed the subject information sheet. All of the females and eight of the men suffered from dominant ichthyosis vulgaris. Of these, 14 had a family history of the disorder. Mean age of the subjects was 27.6 ( $SD = 11.8$ ) and mean age of onset was 3.3 years ( $SD = 3.7$ ). Of these subjects, 44 % had suffered from asthma, 44 % from hayfever, and 17 % from atopic dermatitis. This is consistent with previous findings for this disorder (Wells & Kerr, 1966). None of the subjects, however, still suffered from atopic dermatitis. Five males suffered from sex-linked

ichthyosis. Their mean age was 40.8 years ( $SD = 4.9$ ) and all had suffered with the disorder from birth.

#### *Skin-disorder free controls*

Forty subjects, 27 females and 13 males, were recruited from first year psychology classes. Their mean age was 27.8 years ( $SD = 10.4$ ). These subjects were screened by brief interview to ensure they were free of skin disorders (SDF). There were no significant differences between the four groups (SA, NSA, ICH, SDF) with regard to age.

#### *Materials/ Tests*

The following measures were administered to all subjects.

*Interpersonal Dependency Inventory (IDI)* (Hirschfield et al., 1977)- This is a 48 item self-report device. The scale was constructed from a list of 98 items written by the authors or modified from other scales. These items were administered to two samples; 220 college students and 180 mixed diagnosis psychiatric patients along with measures of neuroticism, anxiety, depression, interpersonal sensitivity, and social desirability. A principal components analysis using varimax rotation for a three factor solution of 19 logically derived clusters of items accounted for 49 % and 48 % of the variance in the normal and psychiatric samples, respectively. The individual items were then subjected to a similar principal components analysis using the three factor solution. On the basis of their factor loadings, ability to discriminate the two samples, and low correlations with the measures of social desirability and anxiety, 48 items of the pool were selected to form the three factors. The first factor Emotional Reliance on Another reflects the dimensions of attachment; a wish for contact with and emotional support from specific others; and dependency; a general wish for approval and attention from others. Lack of Social Self-Confidence is concerned with the desire for assistance in decision-making, in social situations, and in displaying initiative. Assertion of Autonomy is concerned with preference for solitude and independent behaviour. The three scales showed split-half reliabilities of .87, .78, and .72, respectively. Intercorrelations between the scales were highest between Emotional Reliance and Lack of Social Self-Confidence ( $r = .42$ ) and lowest between the latter factor and Assertion of Autonomy ( $r = -.08$ ). With regard to the consistency of the factor structure, the two samples showed a correlation between factor structure of  $r = .80$  or more. Cross-validation on two new samples of 121 normals and 66 psychiatric patients revealed a similar split-half reliability and intercorrelations for the three factor solution. Furthermore, the magnitude of item factor loadings indicated that 43 of the 48 items were correctly assigned in the second normal sample, and 40 of the 48 items in the psychiatric sample. Analysis indicates that the first two scales have moderate positive correlations with neuroticism, anxiety,

and depression. As discussed in the introduction to this chapter, an association with depression is consistent with theoretical views on depressive subtypes (Blatt et al., 1982). A modest negative correlation was also found between the IDI and social desirability.

*Reid-Ware Three-Factor Internal-External Scale (Reid-Ware I-E Scale)* (Reid & Ware, 1974)- This 45-item measure was chosen in favour of other locus of control measures such as Rotter's I-E Scale (1966) because of evidence suggesting locus of control is not unidimensional (Reid & Ware, 1974). In contrast, the Reid-Ware I-E Scale is multidimensional; the three factors of the scale being Self-Control, Social Systems Control and Fatalism. The authors administered a 45 item forced choice questionnaire to 167 college students. Twenty-four of the questions were derived from previous research and included modified versions of items from Rotter's I-E Scale. These items and items specifically written by the authors were thought to reflect the three dimensions of locus of control. The subjects' responses were analysed through the principal axes method and a three factor structure was generated using the varimax method. This approach resulted in three factors which closely resembled the dimensions described by the authors. Individual items, on the whole, loaded highly on their relevant factors; the alpha coefficients for the three scales were: .71 for Self-Control, .76 for Social Systems Control, and .76 for Fatalism. The intercorrelation between the scales was  $r = .30$  for Self-Control- Social Systems Control,  $r = .27$  for Self-Control- Fatalism, and  $r = .39$  for Social Systems Control- Fatalism. These low intercorrelations together with the high internal consistency suggested that the factors were reasonable independent of each other. Regarding the issue of concurrent validity, the Social Systems Control and Fatalism factors correlated  $r = .42$  and  $r = .71$  with scores on Rotter's I-E Scale, indicating that these factors were tapping similar response domains to that scale. Further evidence regarding the reliability of Reid and Ware's scale comes from the Australian study by Dragutinovich and White (1983). They administered the scale to over 530 students and factor analysed their responses using principal components analysis. Three identified factors were subjected to varimax rotation. This procedure revealed factor patterns which confirmed Reid and Ware's (1974) research. Factor loadings were mostly in the order of .50 for individual items, and item-subscale correlations were  $r = .46$  for Self-Control,  $r = .49$  for Social Systems Control, and  $r = .54$  for Fatalism. These results suggested that the scale displayed appropriate levels of reliability. This measure was also chosen because its greater explanation of variance than Rotter's (1966) scale with an Australian population (Dragutinovich & White, 1983), indicating that it was more appropriate for the current context.

*Marlowe-Crowne Social Desirability Scale (MCSDS)* (Crowne & Marlowe, 1960)- This measure is a 33-item self-report measure. The scale was developed as an alternative to the Edwards Social Desirability Scale (Edwards, 1957) which Crowne and Marlowe stated was composed of extreme responses and, therefore, confounded with psychopathology. In the development of their questionnaire, the authors consulted existing personality inventories and selected 50 items that had cultural approval and minimal pathological or abnormal implications if responded to in a desirable or undesirable manner. These items were rated as to their social desirability by independent judges and 47 items were endorsed with 90 % or greater agreement. These items were administered to 76 students and item analysis revealed that 33 items discriminated significantly between high and low scorers. Reliability of the scale was tested on 39 undergraduate students. Internal consistency was examined by the Kuder-Richards formula 20 and was found to be .88. Test-retest reliability over one month based on data from 31 of the students was .89. A comparison with the Edwards scale was made using the 39 students as well as an additional 81 students, yielding a correlation of  $r = .35$ .

Crino, Svoboda, Rubenfield, and White (1983) provided further psychometric evaluation of this scale. They administered both the MCSDS and the Edwards to 236 students. A further sample of 60 students completed both scales on two occasions, one month apart. The test-retest reliability for the MCSDS was .86 while the interscale correlations were .39 and .26 for the two administrations. The internal consistency of the MCSDS was also examined by Crino et al. (1983). The alpha coefficients of the scale for the three administrations were .70, .77, and .73 (mean = .73), figures comparable with the findings of other studies. However, the average interitem correlations were  $r = .10$  or less. Examination of positive and negatively keyed items indicated a split-half reliability of .87, which suggested that tendencies to endorse positive and deny negative features was equivalent. Debate continues over which scale best measures social desirability (e.g., Strosahl, Linehan, & Chiles, 1984). Crino et al. (1983, p. 967) concluded that their data are "not in conflict with the common usage" of either scale. However, in a study published after the current experiment had been conducted and scored, Ballard, Crino, and Rubenfeld (1988) found that over half of the MCSDS items were no longer sensitive enough to be considered useful, and that the original scoring of many items was inappropriate.

*State-Trait Anxiety Inventory (STAI)* (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983)- This widely used inventory contains separate 20-item scales to measure trait and state components of anxiety. Trait anxiety refers to relatively stable individual differences to react with anxiety. State anxiety refers to the intensity of that reaction at a given time (Spielberger et al., 1983). This

differentiation was an important reason for the decision to use this scale as previous studies had often not distinguished between state and trait dimensions of anxiety. The study by Garrie et al. (1974) which also used the STAI was an exception.

Spielberger (Spielberger et al., 1983) developed his initial item pool from items with a demonstrated relationship to other measures with anxiety. As these items were usually trait in nature, they were rewritten so as to provide both state and trait measures. His original version of the scale was standardised on 6,000 high school and college students, 600 neuropsychiatric, medical and surgical patients and 200 prison inmates. In 1983, a revised version was developed so as to improve the psychometric properties of the scales and to provide scales with content that was more consistent with the concepts of state and trait anxiety. This revision (Form Y) was administered to 5,000 subjects. As might be expected, the two versions are highly correlated ( $r = .96$  to  $.98$ ).

Factor analyses reveal clear-cut distinctions between the Trait and State scales. In one study, 424 year 10 students completed the questionnaire. Their responses to the items were subjected to the principal axis method of factor extraction. Four simple factors which could be meaningfully interpreted were extracted. These were: State Anxiety- Absent, State Anxiety- Present, Trait Anxiety- Absent, and Trait Anxiety- Present. In a further study involving 1728 male military recruits and utilising the same method, both two and four factor solutions were extracted. In the first of these solutions, all 20 of the State-Anxiety items loaded on the first factor, while 17 of the Trait- Anxiety items loaded on the second. When the four factor solution was utilised, all of the State Anxiety-Absent items loaded on the first factor, all 9 of the Trait Anxiety- Absent items loaded on the second, 9 out of 10 State Anxiety- Present items loaded on the third, and 9 out of 11 Trait Anxiety- Present items loaded on the fourth. Furthermore, comparison between the two samples with regard to the four factor solution yielded a factor congruency coefficient of greater than .90.

The stability of Form Y of the STAI was examined in two samples of high school students, each comprising over 170 males and 170 females tested in the classroom setting. These subjects were retested after 30 days or 60 days. Test-retest reliability for the Trait scale was  $r = .71$  for males, and  $r = .75$  for females after 30 days. For State anxiety, the correlations were  $r = .68$  for males, and  $r = .34$  for females. For the sample retested after 60 days, the correlations were  $r = .68$  and  $r = .65$  for Trait, and  $r = .51$  and  $r = .36$  for State. The relatively low stability coefficients for the State scale were expected because the scale was designed to be sensitive to situational factors. Spielberger et al. (1983, p. 13) argue that "Given the transitory nature of anxiety states, measures of

internal consistency such as alpha coefficients provide a more meaningful index of the reliability of S-anxiety scales than test-retest correlations." They report the alpha coefficients for large samples of working adults, college students, high school students and military recruits. All but one of the coefficient alphas was above .90, with a median coefficient of .93. The alpha coefficients for the Trait-Anxiety scale was also uniformly high for these samples, with a median of .90. Evidence for the internal consistency of the scales is also provided by the analysis of item-remainder correlations based on the data of the normative samples. The median State- Anxiety item-remainder correlation were: .63 for the working adults, .59 for the college students, .55 for the high school students, and .61 for the military recruits. With regard to Trait- Anxiety, the median item-remainder correlations were: .56 for the working adults, .57 for the college students, .54 for the high school students, and .52 for the military recruits. More than half the items on each scale showed an item-remainder correlation of .50 or greater.

With regard to validity of the STAI, Spielberger et al. (1983) provide some data on construct and concurrent validity. Support for the construct validity of the Trait scale is provided by the fact that the mean scores of the various neuropsychiatric patient groups were substantially higher than all normal groups, providing evidence of the STAI's ability to discriminate between normals and psychiatric patients for whom anxiety is a problem. Furthermore, general medical and surgical patients with psychiatric complications scored higher than patients from these groups without such complications. However, Dreger (1978) argues that such findings cannot be considered basic validity studies.

With regard to State Anxiety, scores of military recruits tested shortly after they had begun a stressful training program were significantly higher than those of college and high school students of about the same age tested under relatively nonstressful circumstances. Furthermore, the fact that the mean State scores for the recruits were higher than their Trait scores suggests that these subjects were experiencing high levels of emotional turmoil when tested. In comparison, the State and Trait scores of the students were very similar. Other evidence for the construct validity of the State scale comes from the finding that college students undergoing examinations report higher scores. Students having received relaxation training report lower scores than those who are tested during normal classes.

The correlation between the two scales has also been examined under stressful and nonstressful conditions. The Trait scale was administered at the beginning and end of a testing session in which college students were exposed to varying degrees of stress. The State scale was given on four occasions across the session. The mean State score increased with increasing stress and decreased

under situations of relaxation. In contrast, the Trait score remained constant. The correlations between the scales varied between .11 and .53 with a median of .30 for females and between .37 and .67, with a median of .47 for males.

With regard to concurrent validity, Spielberger et al. (1983) report a study where the Trait scale, and three other measures of anxiety; the IPAT Anxiety Scale, the Taylor Manifest Anxiety Scale, and the Affect Adjective Checklist; were administered to over 200 hundred college students. The correlation between between the Trait scale and the IPAT was about  $r = .75$  for both males and females, while the correlation between the Trait scale and The Manifest Anxiety Scale was about  $r = .8$ . Correlations of a similar order were found between the STAI and these two measures when neuropsychiatric subjects were utilised. The correlation between the trait scale and the Affect Adjective Checklist was lower;  $r = .52$  and  $.58$  for females and males respectively. However, the correlations between the other two measures and the checklist were also of this order, suggesting it was the least adequate measure of trait anxiety. Fydrich, Dowdall, and Chambless (cited in A. Beck & Steer, 1990) reported that Form Y of the Trait scale displayed a correlation of  $r = .58$  with the Beck Anxiety Inventory, while the State scale showed a correlation of  $r = .47$  in two samples of outpatients with mixed anxiety disorder diagnoses. With regard to the issue of divergent validity, there is little available data. Spielberger et al. (1983) report that when Form X of the STAI was administered to two samples of male neuropsychiatric inpatients, the mean correlation between Trait scale and the Depression scale of the MMPI was  $r = .59$  for the two samples; the State scale showed a mean correlation of  $r = .50$ . Tanaka- Matsumi and Kameoka (1986) reported that the correlations between the Trait scale of Form X and the Beck Depression Inventory was  $r = .73$  while the State scale had a correlation of  $r = .60$  for a sample of nearly 400 undergraduates. Barlow, DiNardo, Vermilyea, Vermilyea, and Blanchard (1986) found that STAI scores may be higher in depressed patients than in anxious patients. Spielberger et al. (1983) state that one of the aims of the revision of the STAI was to improve its divergent validity by improving its discrimination between feelings of depression and anxiety. In order to achieve this, several of the items in the original version which were felt by the authors to be more closely related to depression were replaced. However, there is no evidence presented to support the belief that the scale had improved divergent validity.

Utilisation of the STAI in the current study would allow not only the Garrie et al. (1974) study to be replicated but also allow assessment of relationships between trait and state anxiety, intrapunitive hostility, and neuroticism.

*Beck Depression Inventory (BDI)* (A. Beck, Ward, Mendelson, Mock, & Erbaugh, 1961)- This 21-item inventory is one of the most widely used self-report measures of depressive symptomatology in research and clinical practice. A large amount of data has accumulated on its reliability and validity for both psychiatric and nonpsychiatric populations (A. Beck et al., 1988). With regard to reliability data, fifteen studies involving nonpsychiatric samples have displayed strong internal consistency, with a mean coefficient alpha of .81. Test-retest reliability with nonpsychiatric populations have been examined in five studies, finding acceptable correlation coefficients for periods of between one to two weeks (mean correlation of  $r = .76$ ) and four months ( $r = .62$ ). With regard to validity of the BDI, over thirty-five studies have reported correlations between the BDI and concurrent measures of depression. Those studies that have utilised nonpsychiatric populations have found a mean correlation of  $r = .60$  with clinical ratings, .77 with the Hamilton Rating Scale of Depression, .60 with the MMPI-D, and .71 with the Zung (A. Beck et al., 1988). These authors concluded that although the BDI had a stronger relationship to clinical estimates of depression in psychiatric samples than normal samples, the BDI displayed comparable relationships with other depression instruments irrespective of the sample. This suggests that the BDI is a valid instrument for use with normal populations. These authors also reviewed studies which indicated that scores on the BDI could differentiate depressed and alcoholic patients from normal, and psychiatric patients from normals, thereby demonstrating the instrument's discriminative validity. Construct validity has also been demonstrated as well. For example, while studies reviewed by A. Beck et al. (1988) have found that scores on the BDI are significantly related to self-reported anxiety, there was only a small relationship between clinical ratings of anxiety and BDI scores. Although the BDI has been found to correlate significantly with self-report measures of anxiety, this may be due to both instruments measuring the same symptoms (Mendels, Weinstein, & Cochrane, 1972). Sacco (1981) concluded that the BDI assessed only the state dimension of depressive symptomatology. However, A. Beck et al. (1988) suggest that the instructions given to the subject with regard to the time frame they are to consider when making their responses determines whether state ratings or more enduring attitudes and feelings are assessed.

*Eysenck Personality Inventory (EPI)* (Eysenck & Eysenck, 1964)- The EPI was chosen to measure the personality dimensions of neuroticism and extraversion. Extraversion refers to the personality features of sociability and stimulus-seeking impulsiveness. Neuroticism refers to the degree of emotional stability and reactivity displayed by individuals; those scoring highly on this dimension are said to experience overreactivity and be emotionally unstable.



According to Eysenck and Eysenck (1964), they report hypochondriacal concerns and develop neurotic disorders under stress. Eysenck's development of a theory of personality focusing on these elements stems from his observation that these two dimensions have been repeatedly identified in studies of personality.

The EPI is a revision of the earlier Maudsley Personality Inventory and Lanyon (1975) reports that studies indicate that the two scales show a correlation of about .70. There are two parallel forms (A and B) to the EPI. Either can be used or they can be administered together. In addition to the two personality scales, there is also a nine item Lie scale for each form which was developed through adaptation and rewriting of the Lie scale of the MMPI. This scale was designed to measure a desirability response set. The test-retest reliability of the forms was assessed on two samples. The first sample of 92 subjects were assessed after one year. On Form A (the form used in the current study), Extraversion had a test-retest reliability of  $r = .82$  and Neuroticism had a correlation of  $r = .84$ . With the second sample of 27 subjects retested after 9 months the correlations were .97 and .88, respectively. The test-retest reliability of the Lie scale was assessed on a sample of 80 subjects was  $r = .78$ . Split-half reliability using the two forms was assessed on three samples of 1,655 normals of mixed occupations, 210 neurotics, and 90 psychotics. For Extraversion, the correlations for these groups were .76, .75, and .74, respectively, while for Neuroticism the correlations were .81, .87, and .90. The correlation between the two scales for these same samples were -.06, -.09, and -.09 for the combined form version and -.01, -.05, and .05 for Form A.

Howarth (1976) investigated the reliability of the EPI through item-scale correlations. He administered the EPI to 653 female and 666 male students. Each item was correlated to the Extraversion and Neuroticism scales for males, females, and combined samples. The Neuroticism scale was found to be homogenous, with items showing a satisfactory item-scale correlation. Furthermore, the items showed a low cross-correlation with the Extraversion scale. However, the Extraversion scale was less homogeneous; some items correlated less than .30 with the scale, while the highest correlation was .56. Six of the items correlated greater than .20 with the Neuroticism scale. Product-moment correlations between the two scales were -.19, -.06, and -.12 for the female, male and combined samples, respectively. Factor analyses using principal components analyses and promax variation showed that the items comprising the Neuroticism scale did load on this factor. However, only four of the Extraversion scale items loaded highly on this factor. If the criterion was lowered, only nine of the items loaded. This cast some doubt on the reliability of the Extraversion factor.

Limited direct psychometric validity data for the EPI is presented. Eysenck and Eysenck (1964, p. 12) argue that "one possible criteria of validity which is in line with procedure in the more exact sciences is that the tests should fit in with predictions made from a more general theory." They state that there is much evidence from studies on the MPI to suggest that this occurs. Eysenck and Eysenck suggest that studies have shown that when independent judges are asked to rate subjects as introverted or extraverted or stable and unstable, and subjects subsequently complete the EPI, there is concordance between the two approaches. Other studies have demonstrated similar findings. For example, J. E. Gray (1972) investigated the relationship between Neuroticism and Extraversion scores and self-ratings of these dimensions on a seven point semantic differential scale. The subjects in this study were 120 female and 11 male nurses. The two measures of extraversion correlated .48 with each other, while the two measures of neuroticism correlated .21 with each other. While the correlation between Extraversion and Neuroticism scales was nonsignificant (-.10), the relationship between self-ratings of the two dimensions was significant (-.19). In a study addressing the issue of convergent validity, McCrae (1982) administered the EPI to 139 male and 142 female subjects aged between 21 and 89. The subjects also completed the NEO, a 144 item questionnaire that measured the dimensions of neuroticism, extraversion, and openness. The spouses of subjects rated the subjects on a rating form of the NEO. With regard to neuroticism, the EPI and NEO correlated .62, while the EPI correlated .52 with spouse rating. For extraversion, the EPI correlated .60 with the NEO and .39 with spouse rating. Correlations between the scales of the EPI and their reverse scale on the other measures were low and nonsignificant. This study suggests that the EPI displays both divergent and convergent validity. With regard to the Lie scale, Wen (1976) examined the item validity across race and sex. He administered the EPI to 640 students comprising four equal groups of black and white, male and female subjects. Item-total score point-biserial correlations were calculated. Only two of the nine items were consistent across race and sex, while the other seven were limited to either race or race and sex combinations. The scale was most valid for black females with five of the nine items showing significant point-biserial correlations. White males showed the least validity with four significant correlations. Therefore, this suggests there may be some questions regarding the validity of the items of the Lie scale.

*Rosenzweig Picture-Frustration (P-F) Study (RPFS)* (Revised Adult Form) (Rosenzweig, 1978)- This is a 25-item limited projective technique that measures both direction and type of aggression in response to frustrating situations. With regard to direction of aggression an individual may turn aggression onto the environment (Extraggession), onto himself (Intraggession), or evade the

aggression altogether (Imaggression). Under type of aggression, the individual may focus on the frustration's cause (Obstacle-dominance), defence of the ego (Ego-defense), or pursuit of the goal despite the obstacle (Need-persistence) (Rosenzweig, 1978).

With regard to the reliability of the RPFS, there have been many studies conducted. Taylor (cited in Rosenzweig, Ludwig, & Adelman, 1975) found that there was little reliability for the Group Conformity Rating and that the reliability of the scoring categories ranged from .10 to .58. They attributed the low reliability to large item variance and, therefore, low internal consistency. Lake, Miles, and Earle (cited in Rosenzweig et al., 1975) found that split-half reliabilities were poor for direction of aggression categories and nonexistent for type of aggression. However, Rosenzweig et al. (1975) argue that the data of Lake et al. indicates that the correlations for all three directions of aggression were significant. Their own analysis of split-half reliability on two samples subjects; 45 male medical students and 35 female student nurses, found that only three of the six scoring categories for each sample displayed significant correlations between odd and even items. Only one of these categories (Ego-defense) was similar for both samples and one was a negative correlation. Rosenzweig (1978) argues that the stimulus items of the RPFS are intentionally heterogeneous, that the two halves of the test are not equivalent, and that the sequence of items is important in the determination of personality. Therefore, "reliability formulas which assess internal consistency by assuming item homogeneity or by comparing either the first and second halves of a test or its odd and even items tend to violate the basic nature of semiprojective techniques and are not appropriate indicators of their reliability" (Rosenzweig, 1978, p. 9).

However, Rosenzweig (1978) feels that test-retest reliability is an appropriate method of assessing the reliability of the RPFS. He (Rosenzweig et al., 1975) examined this utilising the two samples of students described above. The medical students were retested after seven and a half months and their correlations for the scoring factors were all significant, ranging from .34 to .71 (mean = .52). The female students were retested after two months and their correlations for the scoring factors were all significant with the exception of the Group Conformity Rating. They ranged from .21 to .61 (mean = .45). While early reviews of the RPFS were critical (e.g., Dana, 1959), reviews of the revised version (Viglione, 1985; Wagner, 1985) concluded that the test-retest studies indicate four of the six categories (Extragggression, Imaggression, Ego-defense, and Need-persistence) show adequate reliability, and appear to reflect trait dispositions.

The validity of the RPFS has been examined in a number of ways. Lindzey and Goldwyn (1954) conducted a series of studies on the validity of the RPFS that varied in their approaches. In their first study, they compared 40 delinquent and 50 nondelinquent boys aged between 12 and 13 years matched on intelligence and socioeconomic status. Based on the previous literature, they predicted that the delinquents would display higher Extrapunitiveness or externalised aggression, lower social conformity as indicated by lower Group Conformity Rating score, and increased evidence of instability and inadequate adjustment as indicated by a higher incidence of trends in the scoring of the RPFS. Contrary to prediction, the delinquents actually scored lower on Extrapunitiveness. This may have been due to the use of a training system emphasising credit for lack of aggression, which led to a generalised inhibition of aggression that extended to responses on the RPFS. Both groups scored lower than the Group Conformity Rating norms for their age group, making examination of the second hypothesis impossible. The third hypothesis related to the incidence of trends was supported, however.

In their second study, Lindzey and Goldwyn (1954) examined the relationship between the RPFS and several sets of ratings designed to measure aggression. Twenty college undergraduates were asked to rate themselves with regard to physical aggression, verbal aggression, and aggressive thoughts in face-to-face encounters. Observers rated subjects on the basis of an autobiography and interview. Ratings were also made by a diagnostic council on the basis of case material, test results, fantasy productions, interview material, autobiography and other material. There was a significant correlation between observer ratings of aggressive behaviour ( $r = .42$ ) and scores on Extrapunitiveness. Self-rating of behavioural aggression was also positively correlated with Extrapunitiveness ( $r = .28$ ), while diagnostic council ratings were negatively correlated ( $r = -.17$ ). This suggests that the construct measures overt and conscious aggression. In the third study, two measures of aggression derived from word association techniques were examined in relation to Extrapunitiveness. These were the number of aggressive responses and the speed of response to neutral versus aggressive words. Twenty students were assessed on their responses to the list as well as to an individually administered RPFS. The correlations between Extrapunitiveness and the two measures were both low but positive. This result may be due to the fact that word association does not correlate with overt behaviour.

In the fourth study, Lindzey and Goldwyn (1954) examined whether the RPFS predicted the manner in which subjects responded to a stressful task. Subjects were given difficult maths problems to solve which they were told were easy. They were hurried and criticised during the task as well as having their blood pressure and a measure of cardiac functioning taken. After the task, they

were interviewed by a psychiatrist about the levels of hostility or anger they experienced. A psychologist rated their responses on a scale ranging from extrapunitive to intrapunitive. There was no association between these ratings and their responses to the RPFS. Therefore, the studies by Lindzey and Goldwyn (1954) offer only limited support for the validity of the RPFS.

Rosenzweig & Adelman (1977) reviewed the evidence for construct validity of the RPFS. They considered construct validity to reflect the degree to which constructs accounted for test performance. This could be assessed by experimental evaluation and manipulation of variables directly related to the constructs. They provide evidence from a number of studies to support the construct validity of the RPFS. From a developmental perspective, the RPFS constructs imply that there is a developmental sequence during which the child matures to the point where they inhibit their aggressive responses and become more conforming. Evidence from studies by Rosenzweig shows that from 4 to 13 years of age, there is a decrease in Extraggression and increase in Intraggression, Imaggression, and group conformity. Furthermore, during adolescence, there is an increase in Extraggression and ego-defense and a fall in Intraggression and group conformity as the child rebels against authority and seeks an identity. As might be predicted, this is more evident in males. When young adulthood commences there is a stabilisation of all scoring patterns which is maintained through middle age. With regard to correlations with indicators of aggression on other measures such as the TAT or Rorschach, Rosenzweig and Adelman (1977) report that there have been mixed results. For example, Kaswan, Wasman, and Freedman (cited in Rosenzweig & Adelman, 1977) found that high Extraggression scores were related to 22 measures of aggression derived from the Rorschach, a psychiatric interview schedule, and case history data in a sample of prison inmates. However, Rosenzweig and Adelman (1977) caution that because projective devices do not provide direct measures of aggression the skill of the clinician in interpretation plays a large role in determining relationships between measures. Studies reviewed by the authors on the effect of exposure to a frustrating task have tended to yield a consistent pattern; there is an increase in Extraggression and a decrease in Intraggression.

Govia and Velicer (1985) examined the relationship between the RPFS and another measure, the Buss-Durkee Hostility Inventory. They predicted that low correlations may exist between the two instruments due to the fact that the former was based on specific acts of behaviour defined as aggressive while the latter was based on verbal responses that required interpretation. The Buss-Durkee consists of 75 items related to 5 aggressive type response scales and two scales associated with hostile or guilty attitudes. The relevant scales in Govia and Velicer's (1985)

study were Assault (physical violence), Indirect Hostility (gossip and temper tantrums), Negativism (reluctance or stubbornness), Resentment (jealousy), Suspicion (distrust or paranoia) and Verbal Hostility (threatening and abusive language). Subjects in the study were 90 female and 32 male students who were administered the Buss-Durkee and the Desirability Scale of the Personality Research Form in one session and the RPFS in a second session a week later. The Desirability Scale is a measure of social desirability included to assess the relationship of the other measures to this dimension. Three raters scored the RPFS. Pearson product-moment correlations were calculated among the dimensions of the Buss-Durkee and the nine RPFS categories. The results suggested the relationship between the two measures was consistent. Extrapunitiveness (blame directed out) and Extragggression (aggression directed out) were associated with Assault, Irritability, Resentment, and Verbal Aggression. Similarly, Ego-defense (where frustration arouses a self-protective reaction) is associated with Assault. Conversely, Impeditive (frustration denied) and Intragggression (frustration turned inwards) are both inversely correlated with Assault. Impersistence (the individual takes responsibility for the frustration) and Imaggression (the frustration is minimised) were both inversely related to levels of Assault and Resentment. The latter was also inversely related to Irritability and Verbal Aggression. Finally, Need-persistence (frustration is overcome in pursuit of a goal) was inversely related to Irritability and Resentment.

These results suggest that individuals who report a tendency to blame others or who direct their hostility outward also report a tendency to assaultive, irritable, resentful, and verbally aggressive behaviour. Individuals who respond to stressful situations with calm report less irritability, verbal abusiveness, and resentment when provoked. Those who internalise hostility and who seek solutions to problems also report little assaultive behaviour. Therefore, the fact that the two devices report consistent findings provides evidence of the convergent validity of the RPFS. While the Buss-Durkee showed no relationships with Desirability, the female subjects displayed a positive association between Extrapersistence, Imaggression, and Need-persistence and the desirability items. Govia and Velicer (1985) suggested that women may be less willing or able to express aggression. Overall, the evidence supporting the validity of the RPFS is inconsistent. However, Wagner (1985) and Viglione (1985) both conclude that cautious use of the RPFS is acceptable.

#### *Procedure*

All the ichthyosis sufferers, and all atopic dermatitis sufferers who were not university students, were visited by the experimenter at their home or place of work. Those atopic dermatitis sufferers who were university students, and all of

the skin disorder-free group, were seen by the experimenter in his office at the university. In both cases, subjects were informed as to the purpose of the study, and had each of the tests explained to them. Subjects were assigned an identification number and this was written on all test material in order to protect anonymity and to ensure scoring would be blind. Because the test publisher had assigned "restricted access test" status to the EPI, STAI, and RPFS, they were completed with the experimenter present, either before or after the other tests were completed. If they were completed before the other tests, they were kept by the experimenter and placed in the subject's envelope on completion of the other tests. The experimenter returned to the subject's house or place of work two weeks after the first meeting. In the case of the university students, the students returned the tests after two weeks. Those that had not done so, were contacted and reminded. To ensure no loss of data occurred, tests were reviewed with the subject and any difficulties discussed.

## Results

Two SA, and three ICH sufferers withdrew from the study. Two SA, one ICH, and five SDF subjects did not complete all the test material and were excluded. This left a total of 38 stress atopic dermatitis, 13 nonstress atopic dermatitis, 20 ICH, and 35 SDF subjects.

Scoring did not commence until all tests had been returned. The subject information sheets were removed from the envelopes of the skin disorder subjects. Tests were then identifiable only by the subject's number, not their group membership. All tests were then marked according to the standard scoring procedures.

In the case of the RPFS, where scoring is more subjective, two scorers; one blind to the hypotheses of the study; independently scored a sample of 50 subjects' records. Initially ten records of this sample were marked by each examiner. Scores were compared for each item and interscorer reliability was determined through standard procedures (Sattler, 1988). Interscorer reliability was a mean of 76 % for the ten subjects' responses. The two scorers used a moderation process in order to resolve scoring of disputed responses. Each examiner then applied the criteria developed from this process to scoring the other 40 records of the sample. Interscorer reliability increased to a mean of 84 % for these records. This is comparable to the results reported by Clarke, Fleming, and Rosenzweig (1947). The experimenter scored the remaining 54 records applying the same criteria.

The means and standard deviations of the four subject groups on the BDI and MCSDS, and on the subscales of the EPI, STAI, IDI, and Reid-Ware I-E are shown in Table 10. For the RPFS, the mean and standard deviations for percentage of scores obtained for the six categories of Direction and Type of Aggression are shown. As can be seen from Table 10, a number of differences appear to exist between the groups. However, it was suggested in the introduction that significant interrelationships may exist between measures. If this is the case, then it would be important to control for these interrelationships in any analyses. In order to examine the interrelationships that exist between the personality factors and emotional states examined in this study, pooled within-groups correlations were determined for each variable with all other variables. The resulting matrix is shown in Table 11.

Of particular importance are the relationships between neuroticism and the other variables. As hypothesised, moderate correlations exist between neuroticism and state anxiety; depression; and two of the dependency subscales, Emotional Reliance on Another and Lack of Social Self-Confidence. One of the Reid-Ware I-E subscales, Social Systems Control was also moderately correlated with neuroticism, and the MCSDS showed a moderate negative correlation. Trait



anxiety was highly correlated with neuroticism. Of the two aggression subscales of the RPFS hypothesised to be correlated with neuroticism; extraggression and intraggression; only extraggression showed a low positive correlation. Predicted positive relationships between variables such as depression and dependency, depression and state and trait anxiety, and social desirability and the EPI Lie scale were also found to exist.

The existence of these interrelationships means that analysis of the differences between the groups must proceed with caution. In order to control for the interrelationships between variables, the differences between the groups was first analysed by multivariate analysis of variance (MANOVA). All of the personality and emotional state variables were entered into the analysis. After accounting for the interrelationships between variables, the MANOVA indicated that significant group differences existed (Wilks's lambda = .462,  $F(51, 256.84) = 1.493$ ,  $p < .05$ ).

The next stage of the analysis was to determine the key differences between the groups. This was achieved through the use of a series of analyses of variance (ANOVAS). These revealed that significant differences existed between the groups with regard to neuroticism ( $F(3, 102) = 4.54$ ,  $p < .005$ ), emotional reliance ( $F(3, 102) = 3.75$ ,  $p = .01$ ), control over social systems ( $F(3, 102) = 3.2$ ,  $p < .05$ ), assertion of autonomy ( $F(3, 102) = 4.51$ ,  $p = .005$ ), and the Group Conformity Rating of the RPFS ( $F(3, 102) = 5.11$ ,  $p < .01$ ). Planned comparisons using Student-Neuman-Keuls tests indicated that the NSA group were significantly lower on neuroticism than all other groups, less emotionally reliant on others than the SA group, and had a higher internal locus of control with regard to their influence over social systems than the SA group. A planned comparison also revealed that they reported significantly less trait anxiety than the SA group. The ICH group were found to be more able to assert their autonomy, and were less conforming in their responses to frustrating situations than all other groups. They also displayed more extraggressive responses than the NSA group.

In a final set of analyses, the atopic dermatitis sufferers were compared as a single group to the ichthyosis sufferers and the skin disorder-free controls. The only significant differences that remained were the greater ability of the ichthyosis sufferers to assert their autonomy and their reduced conformity in response to frustrating situations.

Table 10

*Means and Standard Deviations of Scale and Subscale Scores for Subject Groups*

Test Subscale	Subject group			
	Nonstress atopics (N = 13)	Stress atopics (N = 38)	Ichthyosis (N = 20)	Skin disorder free (N = 35)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
<b>Eysenck Personality Inventory</b>				
Extraversion	12.5 (5.2)	11.0 (4.6)	12.3 (4.4)	11.7 (4.7)
Neuroticism	8.0 (4.2)	13.3 (4.3)	12.0 (6.9)	11.1 (3.5)
Lie	2.2 (1.7)	2.2 (1.1)	2.8 (2.0)	2.6 (1.3)
<b>State Trait Anxiety Inventory</b>				
State Anxiety	33.1 (8.3)	34.7 (9.2)	36.2 (13.5)	37.9 (9.9)
Trait Anxiety	34.6 (7.7)	42.3 (9.3)	40.5 (12.2)	39.7 (7.7)
BDI	5.5 (6.5)	9.2 (6.8)	8.8 (8.2)	7.3 (6.7)
MCSDS	17.8 (6.1)	14.2 (4.8)	15.7 (5.6)	14.3 (4.8)
<b>Interpersonal Dependency Inventory</b>				
Emot. Rel. on Anoth.	42.3 (6.5)	49.1 (6.1)	46.6 (8.3)	45.6 (6.6)
L. of Soc. Self-Conf.	30.8 (6.8)	34.0 (6.0)	32.5 (5.8)	31.0 (6.2)
Assert. of Autonom.	29.5 (6.2)	31.4 (5.0)	35.9 (7.6)	30.4 (5.7)
<b>Reid-Ware Three-Factor I-E Scale</b>				
Self-Control	5.6 (2.7)	6.5 (3.0)	5.2 (2.8)	6.5 (3.0)
Soc. Systems Control	3.6 (2.1)	5.5 (2.1)	4.1 (2.7)	4.9 (2.1)
Fatalism	5.2 (3.4)	4.8 (3.3)	4.2 (2.6)	4.9 (3.0)
<b>Rosenzweig Picture-Frustration Study <sup>a</sup></b>				
Extraggession	38.6 (11.6)	43.3 (12.0)	48.2 (13.4)	41.3 (10.8)
Intraggession	31.8 (7.8)	29.1 (7.4)	26.5 (9.0)	28.7 (5.4)
Imaggession	30.7 (9.3)	28.9 (11.4)	25.3 (9.0)	30.0 (7.9)
Obstacle-Dominance	17.0 (5.1)	19.0 (6.4)	20.0 (6.6)	20.9 (7.2)
Ego-Defense	56.8 (11.5)	53.2 (9.4)	53.9 (12.9)	51.4 (11.8)
Need-Persistence	26.8 (10.8)	27.9 (9.3)	26.0 (11.4)	27.7 (9.9)
Grp Conform. Rating	55.2 (6.7)	53.6 (10.6)	46.5 (9.9)	56.1 (7.4)

*Note.* Emot. Rel. on Anoth = Emotional Reliance on Another, L. of Soc. Self-Conf. = Lack of Social Self-Confidence, Assert. of Autonom. = Assertion of Autonomy, Soc. Systems Control = Social Systems Control, Grp Conform. Rating = Group Conformity Rating. <sup>a</sup>Scores for subscales of the Rosenzweig Picture-Frustration Study refer to percentages, not raw scores.

Table 11  
Pooled Within-Groups Correlation Matrix for Tests or Subscales of Tests

Test/ subscale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1.Extraversion	-																		
2.Neuroticism	-.02	-																	
3.Lie	-.32	-.20	-																
4.State Anxiety	-.05	.47	.00	-															
5.Trait Anxiety	-.18	.70	-.06	.66	-														
6.BDI	-.16	.49	.04	.43	.62	-													
7.MCSDS	-.12	-.37	.45	-.12	-.26	.00	-												
8.Emot. Rel. on Anoth.	.08	.50	.01	.29	.44	.39	-.12	-											
9.L. of Soc. Self-Confid.	-.39	.41	.14	.34	.52	.40	-.09	.37	-										
10.Assert. of Autonomy	-.23	-.21	.10	-.11	-.25	-.04	.17	-.26	.04	-									
11.Self Control	.09	.26	-.01	.14	.27	.27	.01	.24	.16	-.31	-								
12.Social Systems Cont.	.21	.47	-.34	.25	.41	.24	-.37	.34	.17	-.38	.35	-							
13.Fatalism	.03	.16	-.15	.14	.22	.18	-.25	.18	.11	.40	.38	.31	-						
14.Extraggession	.21	.19	-.20	.21	.12	.05	-.25	-.04	-.19	-.01	-.02	.05	.08	-					
15.Intraggession	-.20	-.03	.17	-.13	-.02	-.06	.14	.06	.11	-.07	.02	.07	-.05	-.69	-				
16.Imaggession	-.12	-.24	.16	-.17	-.15	-.02	.24	.02	.18	.09	.00	-.12	-.08	-.79	.12	-			
17.Obstacle-Dominance	.07	.08	-.11	-.04	.00	-.01	.00	-.06	.00	-.11	.08	.19	-.06	-.06	.10	.00	-		
18.Ego-Defense	.03	.10	.00	.26	.19	.01	-.22	.00	-.04	.06	.02	-.05	.14	.43	-.38	-.26	-.40	-	
19.Need-Persistence	-.08	-.18	.08	-.24	-.20	.00	.22	.07	.06	.03	-.07	-.07	-.11	-.42	.35	.28	-.23	-.79	-

Note. BDI= Beck Depression Inventory, MCSDS= Marlowe-Crowne Social Desirability Scale, Emotion. Rel. on Anoth.= Emotional Reliance on Another, Lack of Soc. Self-Confid.= Lack of Social Self Confidence, Assert. of Autonomy = Assertion of Autonomy, Social Systems Cont. = Social Systems Control.

### Discussion

The results of this study support the existence of subgroups of atopic dermatitis sufferers. It had been hypothesised that a subgroup of approximately one-third of the group would resemble the Rigid group of Kepecs, Rabin, and Robin (1951), the Restrained group of Kalz et al. (1954), and the Superstable group of D. G. Brown (1967, 1972). These subjects would score lower than normal levels of neuroticism, and report less anxiety, depression, dependency needs, as well as tending to deny feelings of hostility rather than express it. In contrast, it was hypothesised that the other two thirds of the subjects would resemble the Emotionally Labile group of Kepecs, Rabin, and Robin (1951), the Free group of Kalz et al. (1954) and the Unstable group of D. G. Brown (1967, 1972).

If a score one standard deviation or more below the mean Neuroticism score of the skin disorder free subjects (that is, a score of seven or less) is regarded as low, then 11 of the 51 atopic dermatitis sufferers fit this pattern. However, eight of these subjects were in the NSA subgroup (constituting 62 % of NSA subgroup) and three were in the SA subgroup (10 % of subgroup). By comparison, 5 of the 35 skin disorder free subjects (14 %) scored this low on Neuroticism, as did 5 of the 20 (25 %) ichthyosis sufferers. Those atopic dermatitis sufferers who believed that stress did not play a role in the course of their skin condition, the NSA subgroup, are probably representative of the first subgroup of subjects described as Superstable by D. G. Brown (1967, 1972). D. G. Brown's (1967, 1972) Superstable subgroup also tended to deny the role of stress in their skin complaint. Using the subjects' belief in the influence of stress on their skin symptoms in order to categorise the atopic dermatitis subjects appears to have been warranted. The NSA subgroup were found to be low scorers on neuroticism, and to report less trait anxiety, and less emotional reliance on others than the SA subgroup. They constituted 26 % of the sample, a similar proportion to the one-third expected to show this pattern. Compared to the NSA subgroup, the SA subgroup were found to be score high on neuroticism, as well as having a more external external locus of control with regard to social systems. Examination of Table 10 indicates that while the differences between the subgroups on depression, and the dependency measure lack of social self-confidence were nonsignificant, they were in the predicted direction. Neither of the subgroups could, however, be described as clinically depressed. No differences existed between the subgroups on the variables of state anxiety, imaggession, and intraggession. Therefore, with the exception of direction of aggressive impulses and report of state anxiety, some of the evidence supports the existence of two subgroups of atopic dermatitis sufferers. However, given the correlations between neuroticism, trait anxiety, depression, social systems control and the measures of dependency shown in Table 11, interpretation of these findings is more difficult. If one accepts Costa and

McCrae's (1987) view of neuroticism as the tendency to experience negative, distressing emotions then the knowledge that the NSA subgroup who are low in neuroticism would lead one to predict that they would also report low levels of anxiety, depression, and dependency needs. Neuroticism may, therefore, be the pivotal feature in differentiating these two subgroups.

The absence of a difference between the subgroups on intraggression and extraggression was surprising. Given the finding by Lyketsos et al. (1985) that patients with the skin disorders urticaria, psoriasis, and alopecia all reported raised levels of anxiety, depression, intraggression, and extraggression, one would have predicted the same findings for the subgroup they resemble most closely, the SA subgroup. The failure to detect a difference between the subgroups with regard to direction of hostility may be partially due to the low reliability of the intraggression factor of the RPFS indicated in test-retest studies (Rosenzweig, Ludwig, & Adelman, 1975). Alternatively, the finding of no differences between the subgroups on these factors may be due to the fact that actual differences do not exist.

The results of this study would appear not to support the findings of those studies reviewed in the previous chapter regarding the existence of a set of personality characteristics and emotional states that are specific to sufferers of atopic dermatitis. The review of these studies in the previous chapter suggested that atopic dermatitis sufferers would score more highly on measures of neuroticism, depression, anxiety, and intrapunitive aggression, and possibly dependency than a group of normal skin disorder-free controls. These differences were not found to exist. Even when the atopic dermatitis group were divided into two subgroups on the basis of a belief in stress involvement in the course of their skin condition, the differences between the atopic dermatitis subgroups and the normal controls were restricted to one variable; low neuroticism in the NSA subgroup of the atopic dermatitis sufferers.

The study also does not appear to support the concept of a disease-prone personality as described by H. Friedman and Booth-Kewley (1987). Following the results of these authors on other so-called psychosomatic disorders, one would have predicted that the atopic dermatitis sufferers would have scored more highly than normal controls on measures such as depression, anxiety, anger/ hostility/ aggression, as well as being more introverted. The atopic dermatitis sufferers, either as a single group or as two subgroups, did not differ from the skin disorder-free controls on any of these measures. Nor did they differ from the skin disorder comparison group on any of these measures, with the exception of extraggression on which the NSA subgroup of atopic dermatitis sufferers reported lower levels.

This finding of no differences between the atopic dermatitis sufferers and the skin disorder-free controls deserves comment. In contrast to previous studies, the subjects in this study were volunteers recruited primarily through advertisements in

the media; only a proportion were recruited through medical practitioners. Previous studies have employed subjects who were often attending dermatology departments in hospitals, or private dermatologists. While it may be argued that the patients in these earlier studies were more severe cases of atopic dermatitis, this may not be the reason for their utilisation of these medical facilities. One possible explanation is that there is something about the personality of these patients that causes them to seek out health services and consequently become selected as typical atopic dermatitis sufferers in such a study. The study then detects these same personality features and assumes they are characteristic of all atopic dermatitis sufferers. Costa and McCrae (1987) have argued that neuroticism is associated with concerns regarding somatic functioning and health-care seeking behaviour. The evidence presented by these authors suggests that neuroticism is not related to objective health outcome; ill health does not appear to be caused by, or cause, heightened levels of neuroticism. Therefore, those studies that have previously employed atopic dermatitis sufferers recruited from medical facilities may be affected by an artifact of self-selection bias that leads to the sample consisting of subjects with high levels of neuroticism. Furthermore, because of the association of neuroticism with report of anxiety, depression, and intrapunitive hostility, subjects are high scorers on these variables as well. That is, they were composed primarily of subjects of the type comprising the SA subgroup. Support for this argument is found upon examination of the neuroticism scores for those studies that have utilised the EPI with atopic dermatitis sufferers (Al-Ahmar & Kurban, 1976; Jordan & Whitlock, 1972; Tantum, Kalucy, & Brown, 1982). These studies indicate that the mean score across studies is 15.2, a score well above both the mean for the atopic dermatitis group as a whole (12.0) and the SA subgroup (13.3). Because the current study recruited subjects directly from the general community, it may have reduced these biasing problems.

However, this potential explanation of why the current study found no differences between atopic dermatitis sufferers and skin-disorder free controls while previous studies have found differences is not appropriate. Examination of the neuroticism scores for the 13 subjects in the current study referred by medical practitioners revealed they had a lower neuroticism score (10.9) than the the atopic dermatitis sufferers as a whole, lower even than the skin disorder-free controls (11.1). Five of the 13 subjects were members of the NSA subgroup of atopics. This does not support the hypothesis that they would be high neuroticism SA type atopic dermatitis sufferers. Even the SA subgroup subjects of these 13 subjects were not higher on neuroticism than the SA subgroup as a whole (13.7 to 13.3, respectively).

An alternative explanation for the lack of differences between atopic dermatitis sufferers and the skin-disorder free controls does exist. The mean neuroticism score for the skin disorder-free controls (11.1) is above both the normal population mean

(9.1) of Eysenck's (Eysenck & Eysenck, 1964) norms and the mean for students in the same sample (10.0). Although not significantly higher than these two normative groups, it is possible that a differing pattern of results would have been obtained, particularly in the comparison between the SA atopics and the skin disorder-free controls, if the group had been closer to the published norms.

Also deserving of comment is the finding that the ichthyosis sufferers were less conforming in their responses to frustrating situations and more able to assert their autonomy. They also were tending towards more extraggressive responses. Rosenzweig (1978) states that as children mature they become less extraggressive and more imaggressive and intraggressive. Boys tend to socialise later than girls. As the Group Conformity Rating reflects conformity to the norms of a population, it is also affected by the socialisation process. The ichthyosis sufferers were primarily males, and approximately half the sample were aged 25 or under. The scores on GCR and extraggression may reflect an immaturity in the response patterns of these subjects. This hypothesis was not supported as the means on extraggression and GCR for these subjects were not different to those of the group as a whole (46.9 and 47.6, respectively). The greater ability of these subjects to assert their autonomy was possibly related to their responses to frustrating circumstances. Rosenzweig (1978) stated that on the RPFS, aggressiveness could be defined as assertiveness which could be either affirmative or negative in nature. If there is a connection between the concepts, a correlation between the variables would be expected. However, examination of Table 11 indicates no relationship exists between these two factors. Therefore, the differences observed for the ichthyosis sufferers remain unexplained but may reflect unique features of the sample. Replication of the results with a larger sample is necessary before conclusions can be reached as to these observed differences.

In summary, then, the results of this study provide support for the concept of subgroups of atopic dermatitis sufferers that differ on neuroticism and measures such as trait anxiety, and dependency that are interrelated with this personality dimension. Support for the existence of personality and emotional state dimensions that were specific to atopic dermatitis sufferers was not found; either when considered as a whole or as subgroups. However, the higher than normal neuroticism level of the skin disorder-free control group may have masked any differences. The meaning of differences between the ichthyosis group and the other groups are unclear.

**CHAPTER 6**  
**A PSYCHOPHYSIOLOGICAL INVESTIGATION**  
**OF ATOPIC DERMATITIS.**



Attempts of researchers to determine the specific personality features associated with atopic dermatitis were reviewed in chapter 4. The failure of these researchers and those investigating other psychosomatic disorders to find clear evidence for such specific profiles was put forward as a major reason for the decline of this approach. A second significant reason for this decline was the inability of the researchers to provide detailed explanations of the pathways by which these personality factors or emotional factors exerted their influence upon the person's physiology so as to cause the particular disorder. Some researchers proposed that autonomic nervous system activation was a potential pathway for such effects (e.g., Alexander, 1950; Urbach & Gottlieb, cited in Beerman, 1962).

This chapter describes how principles from psychophysiology have been adopted to describe potential mechanisms by which psychosomatic disorders develop. The evidence for the action of these principles in psychosomatic disorders will be reviewed, followed by an examination of those psychophysiological studies that have been conducted on atopic dermatitis sufferers. Firstly, however, the principles of specificity and homeostasis and the evidence supporting their existence will be outlined.

### *Specificity*

Four major types of specificity have been described: stimulus-response specificity, symptom specificity, individual-response specificity, and motivational-response specificity. Each of these will be described in the following section.

#### *Stimulus-response specificity*

It has been proposed that there are predictable patterns of physiological response to stimuli across different people (D. T. Graham, 1972). That is, different classes of physical conditions, psychological stimuli, and emotion-provoking situations tend to be associated with qualitatively different physiological response patterns (Fahrenberg, 1986). Fahrenberg (1986) points out that there are a number of reflexive and adaptive physiological mechanisms that lead to similar responses in individuals to exposure to heat and cold, exercise, anoxia, atmospheric pressure, and pharmacological agents such as adrenaline. Perhaps the area that has received greatest attention with regard to the principle of stimulus-response specificity is the differentiation of emotions.

Ax (1953) examined the psychophysiological responses of subjects to the emotional states of fear and anger. Fear was associated with increases in skin conductance, number of muscle potential, and respiration rate. Anger led to increases in diastolic blood pressure, number of rises in skin conductance, and muscle potential increases, as well as a fall in heart rate. Ax (1953) pointed to the uniformity of response to the emotions across individuals but also acknowledged that the between

subjects variance was greater than that within the experimental conditions. Schwartz, Weinberger, and Singer (1981) found anger and fear could be differentiated in terms of their cardiovascular variables such as blood pressure and heart rate. Ekman, Levenson, and Friesen (1983) found that adoption of facial expressions appropriate to emotions and reliving of emotional experiences led to differing patterns of autonomic activation. These patterns not only distinguished between positive emotions like happiness and negative emotions such as anger and fear, but also distinguished between negative emotions. Stemmler (1989) examined induction of the emotions anger, fear, and happiness through real life experimental manipulations and imagery. He found that fear was associated with reduced head movements, lower skin conductance levels, marked finger vasoconstriction, low finger temperature, and low head temperature. Anger was associated with increased muscle tension in the extensor digitorum, marked finger vasodilatation, and high head temperature. Happiness was not associated with any discriminating features. These differences, however, existed only for the real life context and not in the imagery context. In contrast to previous research, heart rate, respiration rate, and skin conductance responses did not differentiate emotional states. Furthermore, the findings regarding finger vasoconstriction and finger and head temperature decreases in fear but not anger were the opposite to those reported by Ax (1953). However, Wagner (1989) reviewed the studies on physiological differentiation of emotions and concluded that Ax's findings regarding fear and anger were correct, but clear evidence for differentiation of other emotions was lacking (see also Ney and Gale, 1988, for a critique of laboratory studies of emotions). In summary, stimulus-response specificity with regard to emotions is a topic of controversy.

Research on stimulus-response specificity has not been restricted to just emotions. Other stimuli have been demonstrated to elicit similar responses across individuals. B.T. Engel (1959) found that the cold pressor test led to increases in heart rate and blood pressure and a decrease in finger pulse volume. Hunger produced decreases in blood pressure and respiration rate and an increase in skin temperature. Recently, Wilson, Albright, Steiner, and Andreassi (1991) administered an IQ quiz and a cold pressor test to police officers and examined several cardiovascular variables utilising impedance cardiography in addition to blood pressure and skin temperature readings. Using multivariate analysis, it was determined that the IQ quiz led to increases in systolic blood pressure, diastolic blood pressure, and heart rate as well as a decrease in skin temperature. Cardiac output showed a trend towards increasing, while stroke volume decreased slightly and total peripheral resistance increased slightly. The cold pressor test also led to increases in systolic blood pressure, diastolic blood pressure, and heart rate. Skin temperature decreased significantly. In contrast to the IQ quiz, the cold pressor test led to a significant decrease in stroke

volume, and myocardial contractility and an increase in total peripheral resistance. Stimulus-response specificity was indicated by the larger blood pressure and heart rate increases as well as total peripheral resistance increases for the cold pressor test compared to the IQ quiz. Stroke volume, cardiac output, myocardial contractility and skin temperature were lower for the cold pressor compared to the quiz. Wenger, Engel, and Clemens (1957) and R. Davis (1957) are representative of early attempts to describe specific response patterns to stimuli other than emotions. For a review of stimulus-response specificity, see B. T. Engel (1972).

#### *Symptom specificity*

Symptom specificity refers to the tendency of individuals with specific physiological disorders to respond maximally to stimuli in the same physiological system. The work of Malmo and Shagass developed the principle of symptom specificity. Malmo and Shagass (1949) initially examined an unselected sample of 74 psychiatric patients; 47 of whom suffered from head complaints such as headache, and head and neck tension; and 34 of whom complained of heart complaints such as fainting, palpitations, and tachycardia. Twenty-seven cases presented with both complaints. They measured heart rate, respiration rate, and muscle potential (EMG) in the neck under a situation of experimentally induced pain. Those who suffered from head complaints showed an increase in EMG, irrespective of the specific type of head complaint. Those who suffered from heart complaints showed increases in heart rate, heart rate variability, and respiration rate. Furthermore, changes in neck muscle EMG was not associated with cardiovascular symptoms, and changes in heart rate and respiration were not associated with head and neck complaints. Malmo and Shagass (1949) suggested that there was a specificity of physiological response such that the particular physiological mechanism of a complaint is susceptible to activation by stress. Malmo, Shagass, and Davis (1950) found that similar symptom specificity was obtained for three subjects in response to the stress of a psychiatric interview or discussing stressful life events. A large body of research has accumulated on the presence of symptom specificity in psychosomatic disorders. This research will be reviewed later in the chapter.

#### *Individual-response specificity and stereotypy*

The concepts of individual-response specificity and stereotypy developed out of the work of Malmo and Shagass on symptom specificity. Lacey's aim was to examine if a similar principle of individual response patterns applied to the general population. In his initial experiment, Lacey (1950) studied 12 women for up to 10 sessions over a period of up to 300 days. He used a letter association test and measured reactions in systolic and diastolic blood pressure, heart rate, heart rate variability, and palmar conductance. Reaction profiles showed marked differences in patterns and rank correlations suggested individuals may react across time in a consistent manner.

Individual-response specificity refers to the tendency to respond maximally in a single system regardless of the stressor (Anderson, Stoyva, & Vaughn, 1982). Based on their findings, Lacey and Lacey (1958) suggested that individuals tend to react with a characteristic hierarchy of physiological responses across both time and situations, a tendency referred to as individual-response stereotypy. However, individuals may be hyperreactive in some measures and hyporeactive in others. Furthermore, not all subjects displayed consistency. Some subjects displayed large fluctuations or randomly distributed patterns, but Lacey argued even these individuals may show at least partial response stereotypy if more physiological variables were examined (Fahrenberg, 1986).

Individual-response stereotypy and stimulus-response specificity are not mutually exclusive concepts. As Roessler and Engel (1977) point out, "the fact that only 'most' subjects respond to the cold pressor test with an increase in heart rate may be due to a few subjects (among a very large pool of randomly selected ones) who show IR [individual-response] specificity characterised by heart rate slowing" (p. 51).

#### *Motivational-response specificity*

Differences between individuals in response to experimental conditions may be due to differences in the experience of and responding to a stimulus situation by individuals. Ax (1964) referred to this as motivational-response specificity. According to this principle, the subjective interpretation, appraisal and response to a standard stimulus or condition may vary between individuals or intraindividually between sessions. This could be due to momentary motivational changes, attitudes, subjective reactions to the experiment, social interactions and other variables (Fahrenberg, 1986).

Motivational-response specificity is consistent with the research of Schachter (Schachter & Singer, 1962) on determinants of emotions. The appraisal of emotional state was found to be determined by factors such as the personality of the subject as well as the social context. Motivational-response specificity extends this principle to other classes of response and includes other determinants. Without referring to this form of specificity by name, Roessler and Engel (1977) acknowledged that unless one took into account such factors as differences in personality and cognitive appraisal, one was forced to assume a universal stimulus-response specificity. This assumption was not supported by the literature, as it was not possible to account for all individual variance by stimulus-response specificity and individual-response stereotypy alone.

#### *Evidence for specificity*

A number of studies have been conducted which examine the evidence for specificity principles. These studies have largely restricted to the principles of individual-response stereotypy, symptom specificity, and stimulus-response specificity. As the studies of symptom specificity are directly related to psychosomatic

disorders, they will be reviewed in the relevant section in this chapter. Evidence to support the existence of individual-response stereotypy and stimulus-response specificity will now be reviewed.

Engel (1960) was the first to investigate the presence of individual- and stimulus-response specificity simultaneously. He utilised a wide variety of autonomic measures and standardised across individuals, variables, and situations to achieve comparability. Examining the frequency distributions of maximum and minimum responses within a single autonomic variable, concordance between reaction profiles, and correlations between classes of stimuli, he concluded that individual-response specificity did exist, and that stimulus-response specificity occurred as well. In a second study, hypertensive patients also showed both types of patterns, though they showed greater individual-response specificity and this occurred as changes in blood pressure for many patients, supporting the related concept of symptom specificity (Moos & Engel, 1962).

Sternbach (1966) reviewed early studies investigating individual-response stereotypy and found the majority of these studies could be criticised due to their small sample size, limited experimental conditions and physiological measures, and their statistical treatment of the data. In response to these criticism, recent studies on the reliability of individual-response specificity and stimulus-response specificity have utilised more sophisticated designs and statistical analysis.

#### *Stability of physiological responses*

One of the key criteria for establishing the existence of specificity processes is the demonstration of stability across sessions. Robinson, Whitsett, and Kaplan (1987) stated many researchers had assumed that profiles determined in a single session reflected stable, enduring response patterns. This belief was challenged by the finding that some physiological responses displayed differing intersession reliability coefficients. For example, Arena, Blanchard, Andrasik, Cotch, and Myers (1983) examined the stability of several response measures in 15 subjects who were assessed under conditions of relaxation, handwarming through autogenic means, mental arithmetic, positive and stressful imagery, and cold pressor. These conditions were repeated three times over the following four weeks. Arena et al. (1983) found that only frontalis EMG had high absolute reliability coefficients, and hand temperature was reliable for sessions repeated within a week. Heart rate and forearm flexor EMG were less reliable while skin resistance level was not reliable. Converting responses to relative terms did not improve reliability. Other studies have found similar evidence of differing intersession reliability coefficients of physiological responses (e.g., Arena, 1984; Shellenberger & Lewis, 1986). These studies appear to argue against one of the essential requirements of the principle of specificity; stability of response patterns. However, this may be due to the reliance on correlational studies that do not take into

account the influence of stimulus-response specificity and individual-response stereotypy. It has been argued that studies that employ multivariate analysis may offer a better indication of the stability of response patterns (Waters, Williamson, Bernard, Blouin, & Faulstich, 1987).

Waters et al. (1987) examined the issues of psychophysiological response reliability and pattern stability. They examined 30 normal students who underwent tone habituation, a stressful quiz, imaging a time when they were angry, slides of automobile accidents, and a startle reaction. Each test situation was preceded by a baseline. The tests were represented after a two-week interval. The physiological responses respiration, skin resistance and conductance, vasomotor response, skin temperature, frontalis and forearm EMG, blood pressure, and heart rate were recorded. Pearson product-moment correlations between sessions indicated that absolute scores were moderately stable across sessions, but difference scores (Test-Pretest Baseline) were less stable. Of the 10 physiological measures, respiration rate, skin conductance response, skin temperature, and heart rate were found to be stable during most baseline and test procedures whereas diastolic blood pressure, vasomotor response, skin conductance level, and the EMG measures were unstable or inconsistently stable across procedures. Use of profile similarity analyses, a multivariate technique, indicated that reliability of response ranged between 73 % of the subjects on the habituation task to 100 % of the subjects on the stressful imagery task when the overall pattern of response was examined. Furthermore, rank analyses for the most extreme physiological response on the first test revealed that on retest this measure was ranked either first or second for the majority of subjects. The least responsive response system also tended to be more consistent when examined by rank analyses, supporting the findings of Lacey and Lacey (1958). This study, therefore, provided evidence of stability across sessions as well as evidence for the existence of the principles of individual-response stereotypy and stimulus-response specificity.

Arena, Goldberg, Saul, and Hobbs (1989) also examined the evidence for individual-response stereotypy and stimulus-response specificity using multivariate analysis techniques. Sixty-four subjects were assessed on four occasions over a one-month period. Frontal EMG, heart rate, and hand skin temperature were recorded every ten seconds of the following conditions; baseline, mental arithmetic, recovery period, cold pressor, and second recovery period. Each individual's scores on the mental arithmetic and cold pressor tasks were converted to standard Z scores to allow for determination of relative change of the response systems to the conditions. Correlational analyses of absolute scores between paired sessions revealed that EMG and heart rate were the most and least stable modalities, respectively, and that there was less stability when intersession interval increased. This was consistent with the findings of Arena, Blanchard, Andrasik, Cotch, and Myers (1983). Using relative

measures of change did not lead to improvement. Individual-response stereotypy was operationally defined as greatest relative arousal in the same response system for 6 of the 8 stress events. Stimulus-response specificity was defined as exhibiting greatest relative response in a specific response system for 3 out of 4 trials of mental arithmetic and greatest responding in another system for 3 out of 4 trials of the cold pressor. When these response pattern criteria were applied to the standard scores, 42 % of subjects were classified as displaying individual-response stereotypy and 20 % of subjects displayed stimulus-response specificity. Arena, Goldberg, Saul, and Hobbs (1989) argue that the existence of individual response patterns cannot be determined without the use of multivariate statistical procedures.

A body of research regarding the existence of specificity processes and appropriate statistical analyses has been published by the Freiburg University group (Fahrenberg & Foerster, 1982; Fahrenberg, 1986). Foerster, Schneider, and Walschburger (1983) examined two samples of male students; the first group comprising 125 subjects while the second comprised 47 subjects. The first sample were measured on the physiological variables of skin conductance, heart rate, pulse volume amplitude, electromyogram, eyeblink frequency, electroencephalograph, and respiration rate and the psychological variables of perceived increase in heart rate, and self-rated tension, irritability, and alertness measured while they performed mental arithmetic, a free speech response to a TAT-like slide, and the anticipation and actual procedure of blood-taking. The second sample performed a cold pressor in addition to these tasks. They were assessed on the same physiological variables, the psychological variables of perceived heart rate, and self-report of tension, anger, motivation, and helplessness. Foerster et al. (1983) outlined the use of a multiprocedural statistical analysis to examine the evidence for stability of patterns; this procedure utilised number of maximal/ minimal responses, concordance analysis, O-correlation analysis, three-factorial analysis of variance, and multivariate analysis of variance (MANOVA). Variance components yielded from the correlation analyses of the physiological variables were consistent for the two samples: individual-specific response (ISR) patterns contribute to 22-33 % of the explanation of the variance, stimulus-specific response (SSR) patterns account for 6-14 %, and motivation-specific response specificity (MSR) for 17 % of the variance in the responses of the second sample. The inclusion of the cold pressor test in the second sample's task was thought to be responsible for the increase in stimulus-specific response. For the self-report data, the motivation-specific response patterns accounted for a total of 60% of the variance. When a MANOVA was used to control for dependency in the physiological response data, ISR accounted for 25-30 %, SSR for 20-28 %, and MSR for 18-23 % of the variance. For the self-report data, ISR

accounted for 18-23 %, SSR for 17-24 %, and MSR for 30 % of the total variance. The broad similarity of results obtained across different samples and differing analyses suggests the principles are robust phenomena.

The second sample of subjects in this study was retested on the same tasks on two further occasions separated by a week's interval. The repeated measures design employed with the second sample allowed the issue of the stability of these patterns to be assessed. Of the 25 subjects who showed an ISR pattern in the first session, 14 maintained this pattern during the second, and 13 demonstrated this pattern on the third assessment. Therefore, approximately 25 % of the subjects displayed stability in ISR patterns across the two week period. There was considerable variety in the patterns exhibited by subjects, indicating that subjects displayed unique patterns of response. Fewer subjects displayed ISR with respect to the self-report data, but 75 % of them were consistent across sessions. The tests of cold pressor and blood taking demonstrated considerable SSR across the sessions; the former causing greater changes in peripheral constriction, while the latter led to skin conductance changes and decreases in heart rate.

Foerster (1985) replicated these basic patterns of results, finding similar proportions of ISR, SSR and MSR in the response patterns of 58 subjects. Evidence for stability of ISR was found in 25 % of the subjects after two months, but this dropped to 14 % when tested after a year. However, Foerster (1985) argues that even at this level, that some individuals show a relatively stable constitutional predisposition to respond in a consistent manner. (An overview of the Freiburg group's research on the pattern analytic approach is provided by Fahrenberg, 1986, including material previously available only in German.)

In a final study, Robinson et al. (1987) examined the stability of individual-response stereotypy to a range of stressors over four sessions conducted at weekly intervals. Twenty men were asked to perform the same tasks each sessions, a reaction time task, serial sevens addition, mental arithmetic, and backwards spelling. The physiological responses heart rate, heart rate variability, integrated muscle tension (IEMG), skin resistance level, skin resistance response, systolic blood pressure, diastolic blood pressure, and pulse transit time were recorded. Whitsett, Robinson, and Kaplan (1987) had found that rest periods between tasks in which subjects are expected to perform challenging tasks was not likely to give an accurate index of baseline physiological activity. Therefore, activity during the tasks was compared to physiological activity while passively watching slides in two further sessions. Effect size was calculated for each physiological variable for each session for each subject. These values were used to rank order a subject's responses for each task session, resulting in a response profile for each of the sessions. These were evaluated by



Kendall's coefficient of concordance (W) (Siegel, 1956). It was found that all twenty subjects displayed a consistency in reactivity patterns, although there was considerable variation in the degree of the consistency.

A second criteria of individual-response stereotypy is that the subjects' profiles show uniqueness in the response profiles. Composite response patterns were created for each subject by the summation of ranks of the eight variables across the four sessions. Ten subjects displayed most reactivity in skin resistance responses, 5 displayed the greatest reactivity in heart rate, 3 in skin resistance level, and 1 each with IEMG and systolic blood pressure. However, when examining the issue of prediction of stability of response patterns from one session's results, Robinson et al. (1987) found that the use of single sessions to determine profiles of response was likely to be unreliable.

In summary, the studies reviewed above indicate that individual-response stereotypy and stimulus-response specificity are principles that can be experimentally demonstrated. However, the use of repeated assessments and multivariate statistics are necessary components of experimental designs of studies which investigate the phenomenon.

#### *The principle of homeostasis*

The second principle of psychophysiology that is of relevance to psychophysiological discussions of psychosomatic disorders is that of homeostasis. Sternbach (1966) referred to homeostasis as the tendency of individuals to maintain an internal equilibrium, or balance. Therefore, homeostasis does not refer to a fixed state of the organism but a process of continuous oscillation in level of functioning around a point specific to each individual. The dual innervation of organs by the parasympathetic and sympathetic branches of the autonomic nervous system provides a feedback mechanism to maintain homeostasis. Wenger's (1941) concept of autonomic balance, which will be reviewed in a later section, provides an example of investigations on homeostatic levels within individuals.

D.T. Graham (1972) appealed for caution regarding the concept of homeostasis. He stated that it is often ill-defined, appearing to imply that the organism attempts to keep all systems constant. This, he argued, is often impossible as maintaining constancy in one dimension requires changes in another. He further stated that wide variations occur under normal processes, such as increases in body temperature during exercise. However, this is not a failure of homeostasis. Similarly, changes in body temperature during fever may not be a failure of homeostasis, but rather an alteration of one parameter in order to benefit the entire organism. In this case, the change in the levels of the parameter is beneficial to the organism because it has adaptive value. Therefore, the homeostatic control of a particular parameter must be considered in relation to the functioning of the whole organism.

*Specificity and homeostasis in psychosomatic disease: Sternbach's theory*

The task of psychosomatic theories was to provide an acceptable explanation as to why some individuals developed psychosomatic disorders, as well as why one individual might develop asthma and another hypertension. Traditionally, these theorists have explicitly or implicitly began with the concept of constitutional vulnerability; the so-called "weak link", "target organ", or "locus minoris resistentiae" theory (e.g., Alexander, 1950). This concept is still found in current discussions on psychosomatic disorders (e.g., Fahrenberg, 1986; D. T. Graham, 1972; Latimer, 1979; Weiner, 1977). The psychophysiological principles of specificity; in particular, individual-response stereotypy, stimulus-response specificity, and homeostasis were incorporated into theories in order to explain the processes by which the constitutional vulnerability was eventually expressed as psychosomatic symptoms.

Sternbach (1966) proposed a psychosomatic model that incorporated the concept of constitutional vulnerability and the psychophysiological principles of individual-response stereotypy, and homeostasis. According to this model, an organ system exists which is maximally responsive to stimuli, a weak organ, compared to other physiological systems. It is in this organ system that psychosomatic reactions are likely to occur. The maximal responding in this organ system is a form of individual-response stereotypy which may occur as a result of constitutional defects or may be acquired through autonomic learning. Although necessary, individual-response stereotypy is not sufficient to explain the development of psychosomatic disorders. A second necessary condition is that the individual must be exposed to stressful situations that lead to activation of physiological responses. These situations must occur with sufficient frequency and arouse intense and prolonged emotional reactions to produce changes in the organ system. Sternbach (1966) stated that as emotions such as anger are associated with specific physiological changes in most people, such as gastric activity or increased diastolic blood pressure, these emotions display stimulus-response specificity. If stimulus-response specificity coincides with the individual's own stereotypic pattern of responding, then exacerbations of the psychosomatic disorder are more likely.

Sternbach (1966) felt that while a person may show marked individual-response stereotypy in reaction to stressful circumstances, he may avoid psychosomatic symptoms if autonomic feedback and control processes act to maintain effective homeostasis. If the stereotypic reactions of an individual are too extreme, either in terms of excessive or inadequate responses, psychosomatic disorders may develop as a consequence. This failure to maintain an optimal level of functioning is referred to as a failure of homeostasis. Inadequate homeostasis may occur not only as a result of an inability to inhibit excessive reactions, but may also occur as a result of an excessive rebound reaction to stimulation. For example, the inhibition of gastric

secretory processes due to anxiety may be followed by a rebound effect such that there is gastric hyperreactivity. Sternbach thought that inadequate homeostatic controls could be the result of innate or constitutional defects or could be acquired, for example by conditioned autonomic responses. In Sternbach's view, inadequate homeostatic controls are an essential feature of the explanation of vulnerability to psychosomatic processes. Evidence that supports the existence of inadequate homeostatic controls in psychosomatic disorders will be presented in a later section. First, studies examining the role of specificity processes in psychosomatic disorders will be presented.

#### *Specificity and psychosomatic disorders*

The research reviewed above supports the existence of patterns of physiological reactivity that are both unique to the individual as well as the stimulus. Such supporting evidence for specificity principles is a necessary first step in establishing the validity of those theories that attempt to explain the development of psychosomatic disorders by proposing the operation of some form of specificity process. The majority of theories that have done so have focused on some form of individual-response stereotypy. However, there are major exceptions.

#### *Stimulus-response stereotypy*

D. T. Graham (1972) stated that Alexander's (1950) nuclear-conflict theory which was described in chapter 4 is an example of individual-response stereotypy. Alexander believed that unresolved conflicts led to chronic emotional arousal that was reflected in sympathetic and parasympathetic hyperreactivity. The specific patterns of emotional arousal led to the development of specific disorders. However, Fahrenberg (1986) argued that Alexander's theory is more analogous to a stimulus-response specificity pattern as specific conflicts are considered to lead to specific patterns of emotional arousal. He argued that specificity lies in the stimulus; the conflict. Regardless of who is correct, both D. T. Graham (1972) and Fahrenberg (1986) agree that proposed autonomic patterns associated with the emotional states have not received much empirical support.

Graham's own work (Grace & Graham, 1952) on the specificity-of-attitude theory is also an example of stimulus-response specificity. The basic assumption of this theory was that each specific psychosomatic disorder was associated with a specific attitude expressed by the patient towards the situation that had evoked the symptoms. An attitude was defined as what the subject felt was happening to him and what he wished to do about it. In the case of eczema, the hypothesised attitude was one of frustration; sufferers felt they were being frustrated and could not do anything about this except to take it out on themselves (Grace & Graham, 1952; D. T. Graham, 1962; D. T. Graham, Lundy et al., 1962). This theory and nonpsychophysiological evidence in support of it was summarised in chapter 4 and will not be repeated here.

D.T. Graham, Stern, and Winokur (1958) attempted to provide experimental verification of the specificity-of-attitude hypothesis. They examined whether it was possible to achieve physiological changes consistent with those expected to occur in Raynaud's disease: cooling of the skin; and hives: warming of the skin; by the suggestion of attitudes previously hypothesised (Grace & Graham, 1952) to be associated with the disorders. In the case of Raynaud's disease this was the desire to take some direct, hostile action, while for hives, the attitude was one of perceived mistreatment or receiving injury without a desire to take any action. Twenty-four healthy male volunteers were hypnotised, made to relax, suggested the first attitude for 10 minutes, asked to relax again, then received suggestions designed to elicit the second attitude for a further ten minutes. In some cases, subjects received only one suggestion within a session. Results were presented for 41 attitude suggestions collected from 8 subjects. For those presentations of the hives attitude, there was an initial fall, followed by a rise in hand temperature; for the Raynaud's attitude there was a consistent fall in temperature. Analysis of acceleration and deceleration of temperature trends involving all subjects indicated that they were consistent with the hypothesised changes for the majority of occasions. Therefore, the induction of an attitude had an effect on the slope of the temperature curve which was consistent with the specificity-of-attitude theory.

Stern, Winokur, Graham, and Graham (1961) extended this research to hypertension. As predicted, the suggestion of the hypertension attitude; a feeling of being threatened with harm and a need to be ready for anything; was associated with a significantly greater rise in diastolic blood pressure than that associated with the presentation of the hives attitude, but not the Raynaud's disease attitude. This latter difference was in the predicted direction, however. The results for the presentation of the hives and hypertension attitude were replicated in a third study (D.T. Graham, Kabler, & Graham, 1962). However, an attempt to replicate the findings of this research with un hypnotised subjects was only partially successful (F. K. Graham & Kunish, 1965). Other researchers' attempts to replicate the findings of the Graham group also met with partial success (Gottlieb, Gleser, & Gottschalk, 1967) or found that alterations in physiological reactions were dependent on whether the subject was hypnotised or not rather than the attitude suggested to the subject (Peters & Stern, 1971). These latter researchers found that hypnotised groups showed a decrease in skin temperature regardless of the experimental attitude while un hypnotised groups showed an initial drop then a rise in skin temperature regardless of the suggested attitude. Peters and Stern (1971) argue that their results may differ from those of the Graham group because subjects' trance state was evaluated in each session. Furthermore, no subjects were excluded from the analysis whereas the Graham group

excluded those subjects whose hand temperature was below 30 °C, or who showed a drop of 1.5 °C before the first attitude suggestion. These factors were thought to be critical factors in leading to the differences.

In discussing the results of his group's early experiments, D.T. Graham (1962) states that they indicate the presence of a stimulus specificity. That is, when subjects were presented with the same stimulus; the situation and the attitude; they tended to show the same physiological response. Suggestion of the hives attitude, for example, was associated with a rise in skin temperature. As each psychosomatic disease was hypothesised to be associated with a specific attitude, stimulus-response specificity was thought to operate in the causation of the diseases. The repeated and intense adoption of these attitudes in a person lead to the development of the appropriate psychosomatic disorder. In order to explain why the subjects in the experiments did not develop the appropriate psychosomatic disorder; as well as anyone else who ever felt the attitude; further processes must operate. D.T. Graham (1962) suggested that individual-response stereotypy may operate as well in that individuals may tend to adopt the same or similar attitudes to many differing stimuli. Presumably, the repeated and intense adoption of these attitudes lead to the development of the appropriate psychosomatic disorder. However, the criticisms of the specificity-of-attitude theory raised by Kogan et al. (1965) discussed in chapter 4, as well as the finding by Peters and Stern (1971) on the effects of hypnotism on response must be taken into consideration.

#### *Individual-response stereotypy*

The majority of psychosomatic theories, however, have relied on some form of the concept of individual-response stereotypy to explain the susceptibility of individuals to psychosomatic disorders. The work of Malmo and Shagass (1949; Malmo et al., 1950) on symptom specificity is an simple example of individual-response stereotypy. The concept that patients will display maximal physiological responding in the system affected by their disorder has logical appeal to researchers attempting to explain the occurrence of psychosomatic disorders. Since Malmo and Shagass' work, symptom specificity has received considerable attention. Much of this research has concentrated on hypertension.

Engel and Bickford (1961) compared female hypertensives and normotensives on several laboratory tasks and found that for three-quarters of the female hypertensives, the greatest response to the tasks was displayed in the blood pressure. Only a small number of the normotensives displayed greatest reactivity in blood pressure. The hypertensives also displayed greatest individual-response specificity in terms of correlations across tasks and measures. Moos and Engel (1962) also found that hypertensives tended to display greatest responsivity in blood pressure.

Fredriksen et al. (1985) found that on tasks such as letter identification, mental arithmetic, cold pressor, and isometric exercise, hypertensive subjects responded maximally in systolic or diastolic blood pressure. Other studies (e.g., Brod, Fencel, Hejl, & Jirka, 1959; Sullivan, Schoentgen, & De Quattro, 1981) have failed to find evidence of blood pressure responses to stressors in hypertensives. Steptoe, Melville, and Ross (1984) argue that factors such as medication effects and sample composition may affect the results obtained by studies. Furthermore, they argue that autonomic factors may be important in early and borderline hypertension as more consistent evidence of blood pressure hyperreactivity has been found in studies involving mild untreated hypertensives. This is supported by their own study on a sample of men with no prior history of cardiovascular disease. Subjects were asked to perform three tasks; a Stroop interference test, viewing a disturbing movie, and playing a video game. The mild hypertensive group was the most responsive in terms of absolute blood pressure changes and percentage of systolic blood pressure change. The transient group scored in the intermediate range in terms of absolute changes and equally high as the mild hypertensives in percentage of diastolic blood pressure change. Numerous other studies have examined the issue of greater cardiovascular responsivity in patients with coronary heart disease and essential hypertension (for a review, see Krantz & Manuck, 1984; also see Obrist, Light, Langer, & Koepke, 1986).

Not all evidence for symptom specificity comes from research on hypertensives and individuals with coronary heart disease. For example, Walker and Sandman (1977) found evidence for symptom specificity with ulcer patients. Moos and Engel (1962) found that arthritic patients displayed greatest responsiveness in the muscle potentials of muscles located at affected joints. More recently, Lehrer and Murphy (1991) found that although sufferers of muscle tension headaches did not display greater frontal and shoulder EMG reactivity to mental arithmetic and ischemic pain, they did show greater reductions in finger temperature and ear pulse volume reductions. They argued that the ear pulse volume results were consistent with the notion that muscle contraction headaches may be mediated by ischemia in the muscles of the head.

In a study more closely related to atopic dermatitis, Levenson (1979) examined the physiological responses of mild asthmatic sufferers and normals to three stressor films. The films were (a) asthmatic children in hospital, judged to be emotionally significant to the asthma sufferers; (b) an industrial accident; a nonspecific stressful film and; (c) a film on adoption, chosen to test the psychoanalytic theory that maternal separation is emotionally relevant to asthmatics. Although a number of physiological measures were recorded, only interbeat interval (IBI) and respiratory period were found to differentiate the groups. While the normal subjects were nonreactive on either

measure to the asthmatic children film, the asthma sufferers reacted with an increase in respiratory period throughout the whole of the presentation of the film. Their IBI was unaffected, suggesting a complete specificity of reaction. For the industrial accident film, the asthmatics experienced higher respiratory period from the time of the announcement of the film, and throughout the film. Both normal and the asthmatics showed longer IBIs recorded following particularly stressful scenes. The adoption film led to a significant increase in respiratory period for the asthmatics in one section of the film. Both groups were variably reactive in IBI. Therefore, respiratory period, a symptom consistent measure, was able to reliably differentiate the two groups. However, Levenson (1979) states that due to the difference in responding across the films, symptom specificity is not sufficient to explain the results. He also suggested that it is necessary to consider stimulus-response specificity in the explanation of the results as both groups responded similarly to the tasks with respect to IBI.

Not all studies have found supportive evidence for symptom specificity, though. Feurestein, Bush, and Corbisiero (1982) did not find evidence of symptom specificity in migraine, muscle contraction, and mixed migraine-contraction headache sufferers. freedman and Ianni (1985) found that Raynaud's disease sufferers displayed greater skin temperature decreases to presentation of imagery judged to be stressful for the Raynaud's sufferers; losing one's gloves and car keys in a snowstorm. however, both groups showed similar levels of reactivity to general stressor imagery or a neutral scene.

While these studies are generally supportive of the concept of symptom specificity, this does not mean that a causative link between higher reactivity and the development of disease has been established. It is possible that the increased reactivity displayed in these patients' affected systems is an effect of the disease rather than a cause. (Fredrikson, 1989, provides a discussion of possible mechanisms by which hyperreactivity may affect health outcome.) However, there is evidence that is suggestive of the existence of greater reactivity of healthy subjects who display disease risk factors. For example, a number of studies have examined the influence of two factors on cardiovascular reactivity. The first, coronary-prone behaviour pattern or Type A behaviour pattern has been shown to predict cardiovascular reactivity (e.g., Newlin & Levenson, 1982; Corse, Manuck, Cantwell, Giordani, & Matthews, 1982). However, Corse et al. (1982) found that these differences were observed only when Type A subjects were identified through the Structured Interview (Rosenman, 1978) and not the Jenkins Activity Schedule (Jenkins, Zyzanski, & Rosenman, 1971). Muranaka et al. (1988) found that Type A subjects identified by a combination of Structured Interview and Jenkins Activity Schedule data did not display greater reactivity to mental arithmetic than Type B subjects. Steptoe and Ross (1981) found that Type A subjects assessed on the basis of the Jenkins Activity Schedule displayed

less cardiovascular reactivity than Type B subjects on three cognitive tasks. These results are difficult to reconcile but Corse et al. (1982) suggested that the Jenkins Activity Schedule measures different aspects of the coronary-prone behaviour pattern than the Structured Interview.

Albright, Andreassi, and Steiner (1988) suggested that the inconsistent findings regarding the association between Type A behaviour pattern and cardiovascular reactivity may be due to the physiological measures utilised. They proposed that the use of impedance cardiography measures such as stroke volume and total peripheral resistance may be more appropriate. In their study on police officers undergoing an IQ quiz, stroke volume increases were significantly associated with Type A. As they point out, a change in stroke volume can result in compensatory increases or decreases in heart rate, and/or blood pressure. This may represent a consistent response of Type A individuals that is not reflected in traditional cardiograph measures. Obviously, further research is needed in this area in order to clarify these issues (for a review, see Krantz and Durel, 1983; for a meta-analytic review, see Harbin, 1989).

The second risk factor examined that has been associated with greater reactivity in normals is parental history of disease. Greater reactivity has been demonstrated in children of hypertensives (e.g., Hastrup, Light, & Obrist, 1982; Manuck, Giordani, McQuaid, & Garrity, 1981; Manuck & Proietti, 1982). Even children as young as eleven who have hypertensive parents have been found to show higher levels of systolic blood pressure and resting heart rate, as well as a tendency towards greater diastolic blood pressure reactivity (Lawler & Allen, 1981). Newlin and Levenson (1982) found greater reactivity in normal subjects with a parental history of coronary heart disease. These results suggest that cardiovascular hyperreactivity is present before the onset of clinical symptoms, and may have an aetiological role.

#### *Autonomic balance*

Wenger's (1941, 1966) autonomic balance, as well as being an empirical description of homeostatic levels, is also an example of an approach that incorporates the concept of individual-response stereotypy. He based his work on the observations of Eppinger and Hess in the early part of the century. They had presented the concept that individuals may show a sympathetic nervous system dominance, sympathicotonia or of the parasympathetic nervous system, vagotonia. However, this dichotomy had been shown to be too rigid (Sternbach, 1966). Wenger (1941) proposed that the dichotomy may be between the adrenergic and cholinergic branches of the autonomic nervous system. This dominance might be continuous or chronic, or only occur in response to a stimulus. Finally, he suggested that the relative dominance of one branch over another might be distributed around a mean point, which he referred as autonomic balance. Therefore, the dominance of the system could be



described by a single score. However, he found that five main patterns existed; relative sympathetic dominance, relative parasympathetic dominance, autonomic balance, a beta pattern, and a tuberculosis pattern. Wenger, Clemens, and Cullen (1962) examined the autonomic function in 31 patients with stomach or duodenal ulcers, 36 mainly gastritis sufferers, 17 neurodermatitis sufferers, and 16 mainly psoriasis and urticaria sufferers. A large number of physiological measures such as volar and palmar conductance, heart rate, blood pressure, respiration, and temperature of the finger, face and axillary region were recorded while the subject was relaxed and while undergoing a cold pressor test. All patient groups showed a significantly lower autonomic factor score, indicating a relative dominance of sympathetic nervous system activity. Examination of the autonomic patterns during rest suggested that nearly half of the neurodermatitis patients showed a sympathetic pattern, and a third showed the beta pattern. Only 7 % were classified as mixed, and 14 % as parasympathetic. In comparison, a third of the ulcerative patients showed a beta pattern and half were a mixed pattern; the nonulcerative patients showed the reverse pattern. Two-thirds of the other dermatological group were beta, and the other third were mixed. Therefore, while the results of Wenger et al. (1962) indicate some consistency of response for the groups, many exceptions to the rule were often found as shown by the large number of mixed patterns.

The concept of autonomic balance has received less attention in recent years. Wallin (1981), in a review of research conducted by himself and colleagues on sympathetic nervous system activity found that sympathetic activity tends to be differentiated across parameters rather than consistent. For example, sympathetic activity that resulted in vasoconstriction in the skin was not reflected by increases in muscle tone. There was, however, evidence to suggest that sympathetic activity in differing muscles tends to coincide. These results suggest that the mixed and beta patterns described by Wenger et al. (1962) tend to be more common than the more "pure" sympathetic pattern found to characterise the neurodermatitis sufferers.

A recent study that investigated a form of autonomic balance that is relevant to the current series of studies was conducted by Kaliner, Shelhamer, Davis, Smith, and Venter (1982). Asthmatics display beta-adrenergic hyporesponsiveness, cholinergic hyperresponsiveness, and alpha-adrenergic hypersensitivity, and each of these can be potentially implicated in the generation of asthma. For example, alpha-adrenergic receptors control bronchial constriction and mucous secretion in the airway, and both alpha-adrenergic and cholinergic stimulation leads to mast cell mediator release. Beta-adrenergic stimulation inhibits these processes. They investigated the responsiveness to these agents in subjects who suffered from asthma, allergic rhinitis, subjects who were preallergic or displayed positive skin tests to allergens, and normal subjects. Subjects with allergic asthma had significantly increased alpha-adrenergic

responsiveness to administration of phenylephrine. This reaction was not seen in the other two allergic groups or the normal controls. The normal subjects were more sensitive to a beta-adrenergic agonist isoproterenol than the allergic groups. The allergic groups also displayed less of an increase in plasma cyclic AMP levels to administration of the drug, a result consistent with beta-adrenergic hyposensitivity. Administration of carbamylcholine chloride indicated that each of the allergic groups was more responsive than the control group, a result consistent with cholinergic hyperreactivity.

The results of these investigations suggests then that allergic subjects show specific alterations in the neurohormonal balance of the autonomic nervous system in the form of beta-adrenergic hyposensitivity and systemic cholinergic hyperreactivity. The first finding is consistent with the beta-adrenergic blockade theory of allergic disorders of Szentivanyi (1968) described in chapter 1 that has been used to account for the fundamental defects in both asthma and atopic dermatitis. The results of the study also offer important support for the principle of symptom specificity, as there is direct evidence to suggest potential pathways of action of the imbalances. Although atopic dermatitis sufferers were not assessed in this study, the beta-adrenergic theory, the atopic dermatitis sufferers' subnormal cyclic-AMP reaction to isoproterenol (Parker & Eisen, 1972; Reed, Busse, & Lee, 1976) and hyperreactivity to cholinergic agents (Hanifin, 1982), as well as the reaction of the preallergic subjects in Kaliner et al.'s (1982) study, suggest that atopic dermatitis sufferers would display a similar pattern of results.

#### *Application of homeostasis to psychosomatic disorders*

Christie (1975) and Anderson et al. (1982) have suggested that slowness of recovery from a stressor may reflect inadequate homeostatic controls. If an individual displays the individual-response stereotypy and experiences activating stressful situations described in Sternbach's (1966) model, then slowness of recovery would mean that an individual may not have recovered to resting levels of physiological activity before the next stressor occurred. This would lead to a further response within the context of already elevated physiological levels.

Anderson et al. (1982) argue that despite its potential to explain the development of psychosomatic disorders, the rate of recovery of physiological levels to baseline levels has received little attention in research studies. Some studies have, however, examined slowness of recovery in psychosomatic groups. For example, Porter, Snider, Bardana, Rösch, and Eidemiller (1975) found that after a cold pressor test, 23 of 25 patients with Raynaud's disease showed delayed recovery of digital temperature compared to 30 normal controls. White and Gildea (1937) found that hypertensives took longer to return to baseline levels of blood pressure after a cold pressor test than normal controls or anxious patients. Arena, Blanchard, Andrasik,

Appelbaum, and Myers (1985) found that vascular headache sufferers took longer to return to prestress levels of hand surface temperature and cephalic vasomotor response than a group of tension headache subjects. Moos and Engel (1962) found that arthritis sufferers exhibited higher muscle potentials throughout a stressor and slowness of recovery in symptomatic muscle sites compared to hypertensives.

Anderson et al. (1982) examined the evidence for individual-response specificity, individual-response stereotypy, symptom specificity, and slowness of recovery of specific physiological responses in migraine, essential hypertension, tension headache, and arthritis sufferers. The Harvard exercise step-up test and mental arithmetic were used as stressors.

Individual-response specificity within a subject was defined as the same physiological system being maximally responsive for both stressors. Analyses for both tension and lability scores indicated there was considerable evidence of individual-response specificity. Individual-response stereotypy, the tendency for an individual to respond with the same hierarchical pattern of responsiveness to both stressors was found for the tension scores.

Symptom specificity was also examined in the four patient groups. It was hypothesised that the migraine sufferers and the hypertensives would display maximal responsiveness in the vascular system. The tension headache sufferers were hypothesised to show maximal responding in either the vascular or muscular system, while the arthritis sufferers were hypothesised to show maximal responsiveness in the muscular system. There was a tendency for the patients to exhibit symptom specificity for both tension and lability scores. Analyses of variance on each physiological variable indicated that arthritics were the most responsive group on forehead muscle tension and electrodermal response in both sessions. Migraine sufferers were the most responsive group in terms of heart rate for both sessions. The hypertensives were the most responsive group in terms of diastolic and systolic blood pressure; a finding which is not surprising given this was a key criteria in their diagnosis. With regard to slowness of recovery, few significant differences were found. Arthritis patients exhibited the slowest recovery in forehead EMG in response to the exercise stressor. Migraine sufferers were found to display increased rather than decreased diastolic blood pressure after the termination of the mental arithmetic task while the other groups showed a decrease.

While this study found supporting evidence for the presence of individual-response specificity and stereotypy and symptom specificity, there was less support for the presence of delayed recovery. The authors state that the finding of increased frontalis muscle tension and slowness of recovery in that parameter after exercise in the arthritis sufferers is consistent with the findings of Moos and Engel (1962). Slowness of recovery was not found in the blood pressure readings of the

hypertensives in Anderson et al.'s (1982) study. However, the fact that the hypertensives were receiving medication may have been a significant factor in the absence of effect. The authors suggest that further studies with unmedicated groups may be warranted. It may also be the case that some other measure of homeostasis may reveal more positive results. Furthermore, more appropriate symptom-specific variables such as cutaneous forehead blood flow for the migraine sufferers, and EMG readings from symptomatic muscle sites in the arthritis sufferers could be assessed.

The evidence for inadequate homeostatic controls in psychosomatic groups is limited. Some studies find support for the presence of delayed recovery. As will be described in the next section, delayed recovery of function has been identified in specific physiological variables in atopic dermatitis sufferers.

#### *Psychophysiological studies in atopic dermatitis*

The literature concerning physiological and pharmacological abnormalities in atopic dermatitis sufferers was reviewed in the first chapter. Much of this work focused on the skin and on the abnormal vascular reactions of the skin. In summary, the major abnormalities described are white dermographism in response to firm stroking, a tendency towards vasoconstriction of the small blood vessels, delayed blanching in response to injection of acetylcholine, and vasoconstriction in response to application of nicotinic acid. Some authors (e.g., Bystryn & Hyman, 1969; Hanifin, 1982; Kalz et al., 1957) have implicated imbalances in the sympathetic arm of the autonomic nervous system in the occurrence of these abnormal responses. However, Rajka (1975) thought the role of the autonomic nervous system in vascular changes in the skin was overemphasised.

The argument that atopic dermatitis sufferers show sympathetic overactivity was suggested by Urbach and Gottlieb (cited in Beerman, 1962) as early as 1946. They felt that emotional arousal possibly led to alterations in the degree of arousal of the autonomic nervous system, or that affective changes led to a lowering of itch thresholds. Kalz et al. (1957) also believed there was evidence of sympathetic hyperactivity. Other authors argued that parasympathetic overactivity was present (Beerman & Stokes, cited in Solomon & Beerman, 1966; Storck & Heim, cited in Solomon & Beerman, 1966).

The potential role of the autonomic nervous system in the development and exacerbation of atopic dermatitis symptoms had obvious appeal to those researchers attempting to explain the influence of psychological factors on the disorder. The effects of emotional states on the autonomic nervous system are well documented (e.g., Ackner, 1956). The readily observable reactions of blushing with embarrassment or anger, and sweating and pallor as a result of fear are clear evidence of the impact of emotions on the skin. Psychophysiological studies examining the effect of psychological and physical stressors and emotional states on variables

mediated by the autonomic nervous system, particularly those related to the skin, are a logical area for investigation. It is somewhat surprising, then, to find that very little of such research has occurred.

#### *Responses to the cold pressor*

The most commonly investigated stressor examined has been the cold pressor test, a stimulus whose effects are primarily on the cardiovascular system (for a review of the cold pressor, see Lovallo, 1975). Eyster et al. (1952) examined blood pressure changes atopical dermatitis sufferers whose hand was immersed in 4 °C water. Twenty-one of the subjects showed a hyperreactive responses. They showed no acceleration of heart rate. Wenger et al. (1962) found that in response to immersion of the foot, male neurodermatitis sufferers and nonulcerative gastrointestinal patients had a greater increase in heart rate and a smaller increase in diastolic blood pressure than a normative group. Wenger et al. (1962) explain the contrary findings of their study to those of Eyster et al. (1952) on the difference in sex of the subject samples in the studies. The former authors used exclusively males, while the latter used a primarily female sample; Wenger et al. (1962) had previously noted that phase of menstrual cycle affected response. Examination of resting state means indicated that the neurodermatitis sufferers had a higher diastolic blood pressure than the normative sample, though this difference was nonsignificant. The Law of Initial Values (Wilder, 1957) may be a possible factor in these results. This law states that the higher an initial value of a variable, the smaller the degree of response to any stimulus that tends to raise the level of response for that variable. The higher resting rate of diastolic blood pressure for the neurodermatitis sufferers limited the degree to which the cold pressor produced increases.

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Wilder (cited in Myrtek & Foerster, 1986) felt it is most relevant to intraindividual experimentation but was also applicable to a group of individuals. However, Furedy and Scher (1988) state that the Law of Initial Values only holds to within-subject comparisons. (Lovallo [1975; Lovallo & Zeiner, 1975] provides a comprehensive discussion on the application of the Law of Initial Values to the cold pressor.) This law appears relevant to an understanding of the results of this study. However, in a recent study examining physiological responses to stimuli that included a cold pressor, Myrtek and Foerster (1986) found that the Law of Initial Values may be an exception rather than the rule. They argued that Wilder and others had not taken into consideration the  $a(a-b)$  effect described by van der Bijl (cited in Myrtek & Foerster, 1986). This effect states that for any correlation between two values that have a common term such as  $a$  and  $(a-b)$ , the correlation coefficient cannot be zero, whenever  $a$  and  $b$  are independent. Therefore, initial-value dependency, such as in the Law of Initial Values, is contaminated by the negative correlation resulting from the  $a(a-b)$  effect, whenever the correlation coefficient is less than 1.00. They identified three variance components that contribute to the effect. First, there may be differences in reactivity shown by subjects who have the same initial

Johnson and Winkelmann (1965) administered the cold pressor to five children with atopic dermatitis. Their reactions were compared to seven nonatopic children. Both groups showed blood pressure elevations of between 30 and 50 points. The authors commented that the test was extremely uncomfortable for the children and many were uncooperative, limiting the value of the results. Varonier and Hahn (1966) administered the cold pressor to groups comprised of children with asthma, children with asthma and atopic dermatitis, and children with neither disorder. Before the cold pressor, the atopic dermatitis children displayed a higher skin temperature, and a higher heart rate, and the normals were lowest on these variables. The normal children displayed the fastest cooling rate in skin temperature as a result of the immersion and a slower rewarming rate, though this latter difference was nonsignificant. Heart rate increases in response to the immersion were greatest in the normals; a finding attributed to the lower basal levels (Law of Initial Values). Examination of the heart rate recovery curves for the three group indicate that the atopic dermatitis sufferers had a slower recovery but this was nonsignificant. There were no differences between the groups with regard to systolic blood pressure before, during, or after the cold pressor.

Faulstich et al. (1985) examined the response of 10 atopic dermatitis sufferers who were primarily female with the response of 10 age, sex, and race matched controls. The variables forearm EMG, vasomotor response, electrocardiogram, skin temperature, and skin resistance were measured. No differences existed between the groups prior to the cold pressor immersion. The atopic dermatitis sufferers displayed a near significant higher EMG response during the cold pressor, and a higher EMG in the recovery period. While there were no differences between the groups with regard to heart rate increases during the cold pressor, the atopic dermatitis sufferers had a higher heart rate during the recovery period. They also examined the effect of other stressors; subjects were asked a series of intelligence test type questions, to recall the most anxiety-provoking time of their lives for one minute, and engaged in a 10 minute relaxation period. There were no differences between the groups on any of the measures at any of the baseline times. No differences existed between the groups on any of the tasks with the exception of the results of the cold pressor already discussed.

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value. Second, a subject may respond differently to the same stimulus over time despite having the same initial value. Third, measurement error also contributes to the variance. Mytrek and Foerster (1986) argue that since the  $a(a-b)$  effect is a statistical artifact, it must be partialled out before the existence of a 'real' negative correlation between initial values and change scores can be demonstrated. When they subjected 125 male subjects to stimuli such as the cold pressor, breath holding, reaction time and digit series and partialled out the  $a(a-b)$  effect, the Law of Initial Values was found to be the exception rather than the rule.

Faulstich et al. (1985) argue that these results provide partial support for the proposition that atopic dermatitis sufferers display sympathetic dominance of the autonomic nervous system. This study was significant because of its utilisation of a broader range of tasks than in previous studies and the fact that it examined subjects' responses in a number of variables relevant to atopic dermatitis such as vasomotor response, skin temperature, and skin resistance.

The results of these studies provide conflicting evidence regarding the autonomic nervous system functioning of atopic dermatitis sufferers. With regard to blood pressure, the atopics are found to be hyperreactive (Eyster et al., 1952; Johnson & Winkelmann, 1965), and to be no more reactive (Johnson & Winkelmann, 1965; Varonier & Hahn, 1966) or less reactive than controls (Wenger et al., 1962). While sex differences may account for the discrepancy between Eyster et al. (1952) and Wenger et al. (1962), it is not relevant to those studies involving children.

Results for heart rate change were also inconsistent between studies. Eyster et al. (1952) and Faulstich et al. (1985) found the groups not to differ, Varonier and Hahn (1966) found the normals to be more reactive, while Wenger et al. (1962) found the neurodermatitis sufferers to be more reactive. The negative result for Varonier and Hahn (1966) may be due to the higher basal rate of the atopic dermatitis sufferers; the study by Faulstich et al. (1985) reported there was no difference between the groups in baseline scores. Wenger et al. (1962) does not provide precold pressor details of heart rate.

With regard to the possibility of the atopics exhibiting slower recovery as a result of poorer homeostatic controls, there is some supporting evidence. The studies by Faulstich et al. (1985) and Varonier and Hahn (1966) both found that the heart rate of atopic dermatitis sufferers recovered more slowly than that of normals, though this was nonsignificant in the latter study. Faulstich et al. (1985) found further evidence for poorer homeostatic controls with regard to delayed recovery of forearm EMG, but this may be due to higher reactivity during the cold pressor. However, Varonier and Hahn (1966) found that normals displayed a nonsignificant trend for slower recovery of skin temperature after exposure to cold pressor, and no differences in systolic blood pressure.

#### *Changes in room temperature*

Three studies investigated the effect of changes in room temperature. Abrams and Farber (1963) found that at 30 °C, both moderate and severe atopic dermatitis sufferers displayed lower skin temperatures, regardless of sex. At 9-15 °C, there were no differences between the males, and only one female patient was different from the control females. The authors suggest this reflects maximal vasoconstriction in all groups at this temperature. At 35-40 °C, the atopic dermatitis sufferers recorded lower skin temperatures than the controls, but this was significant for the severe males

only. With regard to blood flow, the moderate and severe male atopic dermatitis sufferers displayed lower resting digital blood flow than the male controls for both 30 °C and 35-40 °C temperatures. At 9-15 °C, they showed higher digital blood flows than the normals. There was no difference among the females with regard to digital blood flow.

Eyster et al. (1952) found that atopic dermatitis sufferers displayed more rapid cooling in the toes, fingers, thorax, and forehead when subjected to a room temperature of 20 °C, whereas in a room of 32 °C, they displayed slower rewarming. These results were interpreted as evidence of greater reactivity in the vascular system with a tendency towards vasoconstriction. They also support the hypothesis of impaired homeostatic controls in the form of delayed recovery. Johnson and Winkelmann (1965) found that the atopic dermatitis children had lower skin temperatures at 25 °C room temperature than normal children. In a cool room (20 °C), they displayed a nonsignificant tendency to lower temperatures, and more rapid cooling in the fingers and toes. In a hot room (32 °C), they displayed a more rapid warming of the toes than the nonatopic children, and similar changes to the controls with regard to finger temperature. The authors note that at the time of the study, the children were asymptomatic, and this may account for the discrepancy between their results and those of Eyster et al. (1952) with regard to rewarming. The skin temperature evidence with regard to exposure to cold temperatures supports the concept of a tendency towards vasoconstriction in atopic dermatitis sufferers. The evidence concerning exposure to warm room temperature and that for impaired homeostatic controls in the form of slowness of recovery is less clearcut.

In summary, the results of some studies provide support for the hypothesis that atopic dermatitis sufferers display a sympathetic dominance in the functioning of their autonomic nervous system. This sympathetic dominance has been indicated in observations of resting levels, reactivity and slowness of recovery of functions mediated by the sympathetic arm of the autonomic nervous system. Lower resting levels have been observed in skin temperature (Abrams & Farber, 1963; Johnson & Winkelmann, 1965), and blood flow at higher room temperatures (Abrams & Farber, 1963). Higher resting levels have been observed for heart rate (Varonier & Hahn, 1966), diastolic blood pressure (Wenger et al., 1962), and blood flow at low room temperatures (Abrams & Farber, 1963). Greater reactivity has been observed in blood pressure (Eyster et al., 1952), heart rate (Wenger et al., 1962), skin temperature (Eyster et al., 1952; Johnson & Winkelmann, 1965), and nonsignificantly greater reactivity in EMG (Faulstich et al., 1985). Slowness of recovery has been noted in heart rate (Faulstich et al., 1985; Varonier & Hahn, 1966), skin temperature (Eyster et



al., 1952; Johnson & Winkelmann, 1965) and EMG (Faulstich et al., 1985). However, as the above review has indicated, the results of other studies have provided contradictory evidence.

### *Psychophysiological investigations of itching*

Psychophysiological studies have contributed much to an understanding of the relationship between itching and atopic dermatitis. Schandler (1978) examined cases of "nonphysiologically based eczema" to test the hypothesis that itching was related to hypertensive tonic muscle resting levels. He compared two matched groups of five such eczema patients and a noneczemic control group; with one group of eczema subjects receiving biofeedback of dominant extensor muscle activity, while the others were given instructions to relax. Based on ratings of anxiety, blood pressure, forearm EMG, and heart rate data obtained in sessions, supportive results for the hypothesis was obtained.

D.T. Graham, Goodell, and Wolff (1957) investigated the role of peripheral vasodilatation in changes in skin sensitivity in healthy subjects. They found that experimentally induced vasodilatation was associated with a lowering of pain thresholds. More specifically, the lowest pain thresholds were observed on the commencement of vasodilatation rather than the persistence of vasodilatation. This lowered threshold was not found when the skin was warmed without increased vasodilatation. This finding is of relevance as a previous study (D.T. Graham, Goodell, & Wolff, cited in D.T. Graham, Goodell, & Wolff, 1957) indicated that pain and itch sensations were transmitted through the same nerve fibres, and that itch sensations were the response to stimulation that was not intense enough to be perceived as pain. The study by D.T. Graham, Goodell, and Wolff (1957) suggests that the itch threshold is decreased with vasodilatation.

Edwards, Shellow, Wright, and Dignam (1976) found that those subjects with a history of pruritic skin disease showed a lower threshold for the detection of experimentally-produced itch. Edwards et al. (1976) found that recent life stress had no effect on the absolute level of itch threshold but it did affect the ability to discriminate between intensity of stimulation at higher levels of the stimulus. A history of pruritic skin disease and recent life stress did not interact in their effect; rather they were additive. Those with both features were found to react significantly faster to itch stimuli. It has been demonstrated that those areas affected by atopic dermatitis itch more readily and more persistently in response to itch-producing stimuli such as histamine or proteolytic enzymes (Arthur & Shelley, 1958; Rajka, 1975). Williams (1938) demonstrated that injection of itch-producing histamine led to greatest skin temperature rises in those areas of the body that show a predilection for atopic dermatitis, indicating greatest vasodilatation in these areas. Gaul and Underwood (1950) comment that these same areas are those that show greatest heat loss through

vasodilatation in normals. In atopic dermatitis sufferers, Gaul and Underwood claim there is abnormal vasodilatation in these areas which leads to chronic symptoms through sensations of itching and burning being responded to with scratching. These studies suggest that not only do atopic dermatitis sufferers show increased vasodilatation in those sites where they experience atopic dermatitis symptoms, but this increased vasodilatation leads to a lowered itch threshold.

D.T. Graham and Wolf (1953) investigated vascular reactions in eczema subjects undergoing interviews. In 15 interviews conducted with 14 subjects, there was an increase in skin temperature when subjects discussed events in their lives that were associated with exacerbations of their skin disorder. Approximately half of the reactive hyperemia thresholds; a measure of the tone of minute vessels; taken at these times indicated a decrease in minute vessel tone. When these changes were marked, the subjects often complained of itching and scratched. Even if spontaneous itching did not occur, light scratching with a pin was felt as itchier than the same scratching during periods of no cutaneous vasodilatation. Therefore, these results concur with the findings of D.T. Graham et al. (1957) and Edwards et al. (1976) and provide evidence that psychological factors may lead to physiological changes in the skin that are directly related to symptomatology.

Additional support for the role of psychological factors in itching and scratching in atopic dermatitis was found by Jordan and Whitlock (1972). They found that while the number of trials needed to habituate to an itch stimulus was not significantly greater in atopic dermatitis sufferers compared to controls, the results were in the predicted direction. The atopic dermatitis sufferers required more trials to habituate to the tone conditioned to the itch stimulus. The number of conditioned galvanic skin responses and scratch responses of the atopic dermatitis sufferers during the conditioning phase was significantly more than for the control subjects. The difference in the number of conditioned galvanic skin responses and scratch responses during the extinction phase were in the predicted direction. Due to the correlation between conditionability and anxiety scores, the additional finding that the atopic dermatitis sufferers were more anxious than the controls complicated the interpretation of the results. Therefore, they decided to compare the atopic dermatitis sufferers to a group matched on anxiety. They (Jordan & Whitlock, 1974) found that the number of conditioned scratch responses and conditioned galvanic skin responses during the conditioning phase were still greater for the atopic dermatitis sufferers and that the number of conditioned galvanic skin responses in the extinction phase was also greater. These results indicated that the atopic dermatitis sufferers display a greater tendency towards conditionability of scratch responses, even after level of anxiety has been controlled. Atopic dermatitis sufferers not only respond to certain emotionally upsetting material with vasodilatation and consequent itching, they also display a

tendency to scratch in response stimuli associated with itching more easily. Given their lower itch threshold, there is considerable potential to respond to psychological stimuli with increases in itching and scratching. The psychophysiological studies appear to indicate a major role for psychological factors in the exacerbation and perpetuation of atopic dermatitis symptoms.

*Effect of emotions on skin responses*

The observation that atopic dermatitis sufferers scratch when emotionally aroused has been commented on by many authors. Jordan and Whitlock (1972) state that "close observation of such patients has shown that they scratch readily and that such scratching can be provoked by emotionally disturbing topics" (p. 576). Explanations for the occurrence of such scratching behaviour varies. Jordan and Whitlock's (1972, 1974) research suggests that scratching behaviour may be conditioned in atopic dermatitis sufferers. Other authors have speculated that such emotional arousal created physiological changes that led to the scratching behaviour. Kepecs, Rabin, and Robin (1951) thought that states of emotional conflict induced pathophysiological changes in the skin. These authors felt that this was most obvious with regard to sensations of itching and subsequent scratching in response to unexpressed feelings of anger. Graham and Wolf (1953) stated that "it was immediately obvious that in discussions of life stresses there was flushing of the skin, accompanied by increased itching and scratching, which suggested that significant physiological changes involved in the production of lesions took place in the blood vessels" (pp. 240-241).

Kepecs, Robin, and Brunner (1951) examined the effect of emotional states on the skin. They applied cantharides cerate to the skin of subjects with skin disorders such as atopic dermatitis, exfoliative erythroderma, and urticaria and subjects without skin disorders. They found that the rate of exudation of blister fluid remained constant during states of rest and when the pulse was raised through exercise in normal subjects. Blood pressure rises did not appear to affect the rate of exudation. When subjects were placed in a hypnotic trance, states of relaxation that followed a period of tension or talk of pleasant topics were associated with a fall in exudation rate in all but two instances. On the other hand, talk of an emotionally upsetting topic that led to weeping was associated with rises in exudation rate, irrespective of skin disease status. Weeping that was inhibited either by the subject or the suggestion of the experimenter led to an initial drop in exudation rate followed by a rise. This was interpreted by Kepecs, Robin, and Brunner (1951) as a breaking through of the inhibition at the site of the blister.

D.T. Graham and Wolf (1953) found that vasodilatation of the arterioles and decreased minute vessel tone was associated with arousal in the subject of an attitude of frustration. When subjects developed feelings of hopelessness in the course of the experimental interview, there was no flushing of the skin or increased itching. In cases where weeping occurred in association with feelings of hopelessness and depression, there was improvement in the skin. The skin grew cooler and itching ceased.

Kalz et al. (1957) hypothesised that the absence of the normal flare reaction in response to injection of histamine may be due to the withholding of feelings of resentment and anger. To test this hypothesis, they compared the responses of three groups; 32 atopic dermatitis sufferers, 8 urticaria sufferers, and 20 patients without a skin disorder. To test the influence of emotional state on the flare reaction, Kalz et al. (1957) divided the 32 patients into three groups which have been described previously in chapters 4 and 5, on the basis of a psychiatric interview. The Free subjects were able to express their emotions, the Restrained group tended to suppress their emotions, and the Partially Restrained group occupied an intermediate position. Each of the groups was subjected to a stress interview and were tested for presence or absence of flare before and after the interview.

The 12 Free patients were predicted to display a flare reaction and this was correct in nine of the cases. After the interview, there was a significant increase in the size of the reaction that lasted for several hours. When the interview was followed by another interview designed to relieve the stress, the flare reaction returned to its initial level, or smaller. The seven Restrained patients were predicted to show an absence of flare reactions and this was true for six of the seven patients. Emotional release in the stress interview led to flare reactions in all of the Restrained subjects. The 13 Partially Restrained subjects gave mixed results in the preinterview test but changes after the interview were consistent with the other groups; those that displayed a flare showed an increase and those in which the flare was absent showed one after the interview. The potential for emotional state to influence a phenomenon such as the histamine flare suggests that it is controlled in part by higher order processes. Further support for the role of higher order processes in controlling the histamine flare response comes from the study by West, Kierland, and Litin (1961). They found that 4 of 6 atopic dermatitis sufferers had no histamine flare responses before hypnosis, but 3 of the 4 nonresponders displayed flares while hypnotised. The flares did not persist once hypnosis was ceased.

The studies by Kepecs, Robin, and Brunner (1951), D.T. Graham and Wolf (1953), and Kalz et al. (1957) suggest that emotional factors may influence processes in the skin which appear to be fundamental to the symptomatology of atopic dermatitis. The other studies on the influence of psychological factors on atopic

dermatitis outlined in this chapter are consistent with these results. The current study was designed to provide further information regarding the effect of psychological stimuli on the psychophysiological reactivity of atopic dermatitis sufferers. There were several issues of interest in conducting such a study.

The three psychobiological conceptualisations of atopic dermatitis outlined in chapter 1 all consider psychophysiological mechanisms to be important in atopic dermatitis. Whitlock (1976) felt that emotional factors may alter the abnormal state of the atopic skin by influencing the allergic response, by reducing itch thresholds through vasodilatation and sweating, or by the initiation of spontaneous itching of skin through an unspecified central process. In support of these propositions, he pointed to the experimental evidence of Rovensky and Saxl (cited in Whitlock, 1976) who found that emotional stimuli increased sweating in affected skin and that sweating was directly related to increased itching. He also pointed to the work of D.T. Graham and Wolf (1953) showing that discussion of emotionally disturbing topics led to increased itching and scratching. Whitlock (1976) felt that this lowering of itch threshold was mediated by the release of histamine and proteinases in the skin in response to the emotional arousal rather than by a direct vasodilatory effect by sympathetic innervation. Faulstich and Williamson (1985) drew on their own research (Faulstich et al., 1985) and that of Garrie et al. (1974) indicating that atopic dermatitis sufferers are more anxious than controls. They argued that many of the physiological features of anxiety such as increased heart rate, sweating, and pallor of the skin are mediated by the sympathetic nervous system and, therefore, atopic dermatitis sufferers would show more sympathetic arousal. Their research outlined earlier in this chapter found some support for this proposition. Faulstich and Williamson (1985) concluded that stress, anxiety, and other psychological factors may lead to the pathophysiological mechanisms, possibly through sympathetic mediation. In her conceptualisation, Koblenzer (1987, 1988, Koblenzer & Koblenzer, 1988) focused on the evidence from psychoneuroimmunology and psychoneuroendocrinology to explain how stress might influence immunological and endocrine functioning. She also drew on Faulstich et al.'s (1985) findings regarding increased sympathetic arousal in atopic dermatitis sufferers to suggest a link between stress and Sventivanyi's (1968) beta-blockade theory. According to her, such sympathetic tone would result in greater increases in alpha-adrenergic and cholinergic activity. This would, in turn, lead to greater histamine release and the development of pruritus.

Therefore, while all three of the conceptualisations emphasise psychophysiological mechanisms, Whitlock (1976) does not postulate that atopic dermatitis sufferers show increased sympathetic arousal. Faulstich and Williamson (1985) and Koblenzer (1987, 1988, Koblenzer & Koblenzer, 1988) both argue atopic

dermatitis sufferers display increased sympathetic arousal. While the former do not indicate the precise manner by which this sympathetic activation leads to the pathophysiological processes involved in the disorder, the latter author suggests this may be through increased alpha-adrenergic and cholinergic activity. This would be consistent with the beta-adrenergic blockade theory of Sventivanyi (1968).

The evidence regarding the existence of increased sympathetic activity in atopic dermatitis is mixed. As reviewed earlier in this chapter, sympathetic dominance has been indicated by observations of resting levels, reactivity, and slowness of recovery of functions mediated by the sympathetic arm of the autonomic nervous system. Lower resting levels have been observed in skin temperature (Abrams & Farber, 1963; Johnson & Winkelmann, 1965), and blood flow at higher room temperatures (Abrams & Farber, 1963). Higher resting levels have been observed for heart rate (Varonier & Hahn, 1966), diastolic blood pressure (Wenger et al., 1962), and blood flow at low room temperatures (Abrams & Farber, 1963). Greater reactivity has been observed in blood pressure (Eyster et al., 1952), heart rate (Wenger et al., 1962), and skin temperature (Eyster et al., 1952; Johnson & Winkelmann, 1965). Slowness of recovery has been noted in heart rate (Faulstich et al., 1985; Varonier & Hahn, 1966), and skin temperature (Eyster et al., 1952; Johnson & Winkelmann, 1965). However these studies have also provided contradictory evidence. For example, Varonier and Hahn (1966) found that their children with atopic dermatitis has a higher resting skin temperature than normal children. Eyster et al. (1952) failed to find evidence of heart rate acceleration in atopic dermatitis sufferers in response to the cold pressor, while Wenger et al. (1962) failed to find evidence of greater diastolic blood pressure increases in their atopic dermatitis subjects compared to normals. Faulstich et al. (1985) found that their atopic dermatitis subjects did not display greater heart rate increases than matched controls during a cold pressor but did so in the recovery period. Therefore, the evidence supporting the contention that atopic dermatitis sufferers display sympathetic dominance is not clearcut. As a consequence, it is not possible to state that there is compelling evidence in favour of the two psychobiological conceptualisations that argue that atopic dermatitis sufferers display such dominance (Faulstich & Williamson, 1985; Koblenzer, 1987, 1988). Further investigation is needed in order to determine if atopic dermatitis sufferers do display sympathetic dominance.

Lipowski's (1977) conceptualisation of the major influences on current psychosomatic theory identified psychophysiological response specificity and activation as being of importance. The psychobiological conceptualisations of Faulstich and Williamson (1985) and Koblenzer (1987, 1988) emphasise the existence of increased sympathetic arousal in atopic dermatitis. This pattern of arousal would constitute a form of individual-response stereotypy. However, the conceptualisations

do not clearly suggest that symptom specificity occurs in atopic dermatitis. The principle of symptom specificity would lead to the prediction that the atopic dermatitis sufferers would display greatest reactivity in those variables that were related their symptomatology such as skin and peripheral vascular variables such as blood flow, skin temperature, and skin conductance. Studies reviewed earlier in this chapter showed that there is support for the concept of symptom specificity in relation to some disorders such as hypertension and coronary heart disease.

Evidence for symptom specificity in atopic dermatitis is limited and not clearcut. Eyster et al. (1952) found that atopic dermatitis subjects displayed more rapid cooling of the skin at a room temperature of 20 °C and slower rewarming at 32 °C. Johnson and Winkelmann (1965) found similar results for a room temperature of 20 °C but no evidence of slower rewarming at 32 °C. Abrams and Farber (1963) found evidence of reduced digital blood flow in atopic dermatitis sufferers at 30 °C and 35-40 °C. D.T. Graham and Wolf (1953) found that when atopic dermatitis sufferers discussed emotionally arousing topics, they experienced vasodilatation of the blood vessels of the forearm and a decrease in minute vessel tone. These changes are associated with a decrease in the itch threshold both in atopic dermatitis sufferers (D.T. Graham & Wolf, 1953) and in normals (D.T. Graham, Goodell, & Wolff, 1957) and are consistent with the observation of greatly increased blood flow in acutely affected skin (Bystryn & Hyman, 1969). While these studies provide support for the existence of symptom specificity in atopic dermatitis, other studies do not. For example, Faulstich et al. (1985) found that the cold pressor, IQ-type questions and anxiety-provoking imagery did not lead to greater reactivity in vasomotor response, skin temperature, and skin resistance in atopic dermatitis sufferers compared to normal controls. Therefore, the existence of symptom specificity in atopic dermatitis has not been conclusively shown as yet.

Given the paucity of psychophysiological studies that have been conducted and the contradictory findings of those studies that have been conducted, further investigation of the psychophysiological functioning of atopic dermatitis sufferers appeared warranted. Four main hypotheses were made. The first two of these hypotheses were concerned with the existence of increased sympathetic arousal in atopic dermatitis proposed by the psychobiological conceptualisations of Faulstich and Williamson (1985) and Koblenzer (1987, 1988). First, it was hypothesised that atopic dermatitis sufferers would show greater resting levels of sympathetic arousal than matched controls. Second, it was hypothesised that on tasks that were known to lead to sympathetic arousal, atopic dermatitis sufferers would display greater sympathetically mediated reactivity. The third hypothesis related to the issue of symptom specificity. If symptom specificity exists in atopic dermatitis, then it would be predicted that sufferers would respond maximally on those variables related to their

symptomatology. In the case of atopic dermatitis sufferers, this would be on variables related to the skin such as skin conductance and temperature and those related to the peripheral vascular system such as blood flow. Fourthly, drawing from the work of D.T. Graham and Wolf (1953), Kalz et al. (1957) and Kepecs, Robin, and Brunner (1951), it was predicted that the atopic dermatitis sufferers would display vasodilatory responses such as increased arm skin temperature or arm blood volume at the sites of affected skin compared to the matched sites in controls.

To test these four hypotheses requires careful selection of both variables and tasks. The variables selected should be those that are mediated by the sympathetic nervous system as well as related to the skin and peripheral vascular system so that the existence of symptom specificity can be investigated. To examine whether areas of affected skin display greater reactivity, measures would need to be taken from these sites in atopic dermatitis sufferers and from matched sites in control subjects. To achieve these aims, the following seven physiological measures were selected: finger blood volume, finger pulse amplitude, arm blood volume from an affected skin site, digital skin temperature, arm skin temperature from an affected site, skin conductance level, and heart rate. All of the variables are mediated by the sympathetic nervous system. Wallin (1981) showed that sympathetically-mediated physiological activity such as vasoconstriction, skin resistance, and blood pressure is controlled differentially rather than fluctuating in parallel. Therefore, recording from such a large number of measures was justified.

The selection of tasks was also considered carefully. Selection of a suitable task with which to measure resting levels of physiological activity was considered first. Whitsett et al. (1987) have argued that traditional baseline periods do not provide valid assessment of resting levels of activity as the subject may be anticipating stimulation to occur subsequently. A similar view has been stated by Hastrup et al. (1982) and Krantz and Manuck (1984). These authors have suggested that a more valid measure of resting activity may be obtained by monitoring the responses of subjects in a relaxed state on separate days to the other tasks. Unfortunately, due to the fact that access to the recording equipment and laboratory space was limited, this option could not be adopted. Instead, it was decided to adopt the approach of a number of other studies (e.g., Albright et al., 1988; Anderson et al., 1982; Arena, Blanchard, Andrasik, Appelbaum, & Myers, 1983) and utilise a period of relaxation as a measure of resting levels of activity. It was predicted that during this relaxation period, atopic dermatitis subjects would display evidence of greater sympathetic activity than normal controls which would be reflected in higher heart rate, higher levels of skin conductance, and lower skin temperature.



In order to test the hypothesis that atopic dermatitis sufferers would display greater levels of sympathetically-mediated reactivity, a number of tasks with known sympathetic activating effects were selected. A number of studies had investigated the responsiveness of atopic dermatitis subjects to the cold pressor test (e.g., Eyster et al., 1952; Faulstich et al., 1985; Wenger et al., 1962) which is a potent sympathetic activating task, particularly of the cardiovascular system (Lovallo, 1975). As described in chapter 1, the responsiveness of atopic dermatitis sufferers to the cold pressor was examined in a separate study in this series. This study, however, was omitted due to equipment error. In the current study, three other tasks were selected that were known to have sympathetically arousing effects. The first of these tasks was the orienting response to a sound stimulus. Lynn (1966) stated that the orienting response is associated with a number of component reactions. These include pupil dilation, lowering of auditory threshold and light threshold, orientation of the head towards the source of the stimulus, increase in muscle tonus and electromyographic muscular electrical activity, increased cortical arousal, vasoconstriction of the limbs, vasodilatation in the head, the occurrence of the galvanic skin reaction, a delay then increase in amplitude and decrease in frequency of respiration, and a paradoxical slowing of the heart rate. If the subject is alert and aroused, cortical arousal is limited to the particular area involved with that sensory modality, and the reaction subsides quickly lasting for about a minute. Of the reactions involved in the orienting response, pupil dilation, vasoconstriction of the limbs, and the galvanic skin reaction are all mediated by the sympathetic nervous system.

The second task selected was mental arithmetic. This task has been used in a large number of psychophysiological investigations reviewed in this chapter (e.g., Anderson et al., 1982; Arena, Goldberg, Saul, & Hobbs, 1989; Feuerstein et al., 1982). Mental arithmetic is a stressor which is known to produce strong effects on the beta-adrenergic sympathetic nervous system (Feuerstein et al., 1982; Muranaka et al., 1988). The third task selected for its sympathetic activating effects was playing a video game. The work of Svebak (cited by Apter, 1989) has often utilised a video game representing a car race. Over a course of experiments, Svebak and his associates found that playing this video game resulted in increases in EMG activity, heart rate, systolic blood pressure, respiration rate and amplitude, and cortical activity. These changes were greatest under conditions of threat of electric shock for poor performance ("crashes"). Therefore, the video game led to sympathetically-mediated arousal in the cardiovascular system. The video game used in the current study; *Space Invaders* (©Taito American Corporation); was similar to that utilised by Svebak in that it involved visuomotor coordination, avoidance of collisions, and increasing difficulty due to increasing speed of targets. Research conducted in the psychophysiological laboratory at the University of Tasmania (G. V. Wilson, personal communication,

February, 1986) found that the video game led to strong arousal of the cardiovascular system. For each of these three tasks, it was hypothesised that the atopic dermatitis sufferers would display greater levels of sympathetic arousal than normal controls. This sympathetic arousal would be reflected in higher heart rate, higher skin conductance levels, and those measures related to vasoconstriction in the hand such as lower digital skin temperature, finger blood flow, and finger pulse amplitude. Two other tasks; time estimation and a wire maze; were included in the tasks in order to provide a broader range of tasks. However, no specific hypotheses were made in relation to these two tasks.

The possible existence of a symptom specificity pattern of response was a key area of investigation. It was predicted that evidence of increased reactivity would not just be limited to heart rate increases but would also be reflected in skin and peripheral vascular responses such as skin conductance, skin temperature, and blood flow. Furthermore, the current study also focused on the response of the peripheral vascular system in affected skin to stressful stimuli. As stated earlier, D.T. Graham and Wolf (1953) found that when atopic dermatitis sufferers discussed emotionally arousing topics, they experienced vasodilatation of the blood vessels of the forearm and a decrease in minute vessel tone. These changes are associated with a decrease in the itch threshold both in atopic dermatitis sufferers (D.T. Graham & Wolf, 1953) and in normals (D.T. Graham, Goodell, & Wolff, 1957) and are consistent with the observation of greatly increased blood flow in acutely affected skin (Bystryn & Hyman, 1969). Also Kepecs, Robin, and Brunner (1951) found increases in exudation rates from blisters on the skin when atopic dermatitis sufferers discussed emotionally upsetting topics. On the basis of these findings, it was hypothesised that atopic dermatitis sufferers would display similar reactions to stressful tasks. Specifically, it was hypothesised that they would display evidence of vasodilatation such as increases in skin temperature or arm blood flow in their affected skin during such tasks as the mental arithmetic or Space Invaders video game. The normal controls were hypothesised not to display this reaction.

## Method

### *Subjects*

Twelve atopic dermatitis sufferers, eight females and four males, were recruited through advertisements in the university daily bulletin. All of the volunteers were students at the University of Tasmania. Mean age was 21.5 years ( $SD = 4.2$ ) and mean age of onset of symptoms was 1.8 years ( $SD = 2.2$ ). All of the subjects were suffering from exacerbations of the skin disorder at the time of the experiment. For inclusion in the study, subjects were required to meet two criteria. First, the sites of skin lesions had to include involvement of the area surrounding the flexural joints of the arms as it was a convenient site for attachment of the measurement devices. Second, the subjects' fingers were to be unaffected as this site was used for an unaffected skin comparison site.

The atopic dermatitis sufferers were compared to 12 control skin disorder-free subjects, who were age and sex matched to the skin disorder group. This group was selected as the most appropriate control group as it was consistent with the approach adopted in previous research (e.g., Faulstich et al., 1985). Therefore, utilisation of such a group would enable a direct comparison with the results of the previous research. Their mean age was 23.8 years ( $SD = 3.9$ ). The difference between the groups with respect to age was nonsignificant. None of the control subjects had ever suffered from atopic dermatitis or any other chronic skin disorder. All subjects were paid \$7.50 for their participation.

### *Measures and measurement apparatus*

Responses on seven physiological measures were recorded. With the exception of the two skin temperature measures, all responses were recorded using a Beckman model R511 4-channel Dynograph.

*Finger blood volume (FBV)* - was recorded using a Grass model PPSA photoelectric plethysmographic transducer. The transducer was modified to allow recording of D.C. changes and attached to the index finger of the nondominant hand of each subject by a velcro strip. The transducer was connected to the pen recorder through a Wheatstone Bridge circuit. The DC signal was recorded using a Beckman 9853A coupler set on D.C. Channel sensitivity was set such that the pulse amplitude responses were less than 0.5 mm in height.

*Finger pulse amplitude (FPA)* - was measured by amplification of the FBV response. The output of the FBV channel was fed as an input to a Beckman 9806A coupler with a 0.3 second time constant and a high frequency filter setting of 22 Hz. Sensitivity of the FPA channel was set such that each pulse was approximately 10 mm in height during the adaptation stage.

*Heart rate (HR)* - was determined by counting the number of pulses from the FPA record in the scoring period and converting to beats per minute.

*Arm blood volume (ABV)* - was recorded using a Grass model PP SA photoelectric plethysmographic transducer. In the atopic dermatitis sufferers, the transducer was placed on skin with visible lesions on the anterior surface of the forearm of the nondominant arm as close to the flexural joint as possible. The transducer was attached using a section of 3M Micropore surgical tape that encircled the arm once. The tape was applied with sufficient tension to prevent slippage of the transducer but not obstruct blood flow or muscle movement. In the control subjects, the transducer was attached in a similar manner to the same position as their matched atopic subject. The transducer was connected to the pen recorder through a Wheatstone Bridge circuit. The DC signal was recorded using a Beckman 9853A coupler set on DC. Channel sensitivity was set such that the pulse amplitude responses were less than 0.5 mm in height.

*Skin conductance level (SCL)* - was recorded using Beckman 4 mm diameter silver chloride electrodes attached to the most distal phalanges of the second and third finger of the nondominant hand. The electrodes were used in conjunction with Beckman electrode electrolyte paste and were held in place by adhesive masks with an 4 mm diameter hole. The electrodes were also secured using a small piece of 3M Micropore surgical tape. The signal was recorded using a Beckman 9844 Skin Conductance coupler.

*Digital skin temperature (DST)* - was recorded from the palmar surface of the most distal phalange of the little finger on the nondominant hand. Recording was through a Digitron model PT100 naked thermocouple (0.75 mm lead size) held in position by a small square of 3M Micropore surgical tape.

*Arm skin temperature (AST)* - was recorded from the palmar surface of the forearm of the nondominant hand. Again, recording was through a Digitron model PT100 naked thermocouple (0.75 mm lead size) held in position by a small square of 3M Micropore surgical tape. For the atopic dermatitis sufferers, the thermocouple was placed over an area of affected skin as close as possible to the position of the photoelectric plethysmograph. In the control subjects, the thermocouple was placed in the same position as the matched atopic dermatitis subject. Both the DST and the AST thermocouples were connected via a Digitron model PT100 thermocouple selector to a Digitron model 2751-K digital thermometer, which measured skin temperature to one-tenth of a degree Celcius. At approximately twenty second intervals throughout the course of the experiment, the DST and AST readings were taken and recorded on the output of the pen recorder.

### *Procedure*

The experiment was conducted in a quiet room with temperature maintained at between 23-25 °C throughout the time of the experiment. Subjects were seated in a comfortable semi-reclining chair and were informed of the experimental procedure while the electrodes, thermocouples, and transducers were attached. A board (100 cm x 20 cm x 2 cm) was placed across the arms of the chair to provide support for the subject's arm as well as a firm surface on which to write when requested. Subjects were instructed to move their nondominant arm as little as possible during the course of the experiment. After answering any questions, the experimenter left the room. All measuring equipment was located in an adjoining room and the experimenter and subject communicated via an intercom. All electrical connections were via a plug board.

There were seven phases to the experiment and, with the exception of the adaptation phase, each phase had a duration of 180 seconds. Before each phase, subjects were reminded of the instructions and then a 40 second pretask baseline period was recorded. With the exception of the adaptation phase, subjects were asked to complete the short version of the Stress-Arousal Checklist (King, Burrows, & Stanley, 1983) described in chapter 3. The questionnaire was designed to assess subjects' perception of arousal, defined as ongoing autonomic and somatic activity; and stress, defined as an internal response to not coping with the demands of the environment (Wilson-Evered & Stanley, 1986). The reliability and validity of this measure has been described in chapter 3. This measure was chosen because of its sensitivity to state changes (Wilson-Evered & Stanley, 1986) and its quick administration. This latter point is of importance as King, Stanley, and Burrows (1987) indicate that a measure should be as short as possible, while retaining validity, so as to minimise artifactual increases in arousal as a result of the test procedure. Subjects were reminded at the end of each phase to complete the appropriate copy of the questionnaire (numbered according to the phase) and to indicate when they had completed it.

The seven phases of the experiment were:

*Adaptation phase* To allow for adaptation to the room and the room temperature, subjects were asked to remain seated quietly until the experimenter spoke to them. During this time, the measures were calibrated by the experimenter. This phase had a duration of ten minutes and with the initial time involved in connecting the subject, the total time for adaptation to the room temperature was approximately 30 minutes.

*Relaxation* The subject was requested to close his or her eyes and to relax as much as possible until instructed to stop.

*Time Estimation* The subject was asked to estimate the passage of 30 seconds of time. The experimenter indicated the beginning of a trial with the word "start" and the subject indicated the time had elapsed by the word "stop". Each subject had five time estimation trials, the beginning and end of each was marked on the pen recorder sheet by the experimenter by activating an event marker pen.

*Orienting Response* The subject was informed that at random intervals a tone would be presented. The subject was instructed that they did not have to respond in any way but were to remain seated quietly. A series of six tones were presented at random intervals (range = 20 to 40 seconds). The tones were presented through a 1 kHz Sonalert. The tone was 95 decibels in loudness and presentation time was one second.

*Mental arithmetic* The subject was instructed to provide an answer to a serial subtraction task (subtracting 7 starting from 998) at the sound of a tone presented each five seconds.

*Video game* The experimenter entered the subject room and turned on a colour television monitor that had been placed directly in front of the subject at head height at a distance of approximately two metres. An Atari Video Computer systems model CX-2600 was connected to the monitor. The board that the subject rested on was removed and replaced with one of a similar size that had the video game control stick fixed to it. The video game utilised was Space Invaders (Atari cartridge CX-2632; ©Taito American Corporation). The subject was instructed that at the experimenter's command, they were to press the start switch on the game console beside them and begin playing the game. If the game finished before the experimenter signalled the end of the phase, they were to restart the game and continue playing until asked to stop. The subjects were to use their dominant hand only to play the video game and were reminded to keep the nondominant arm as still as possible. The experimenter left the room and after a stabilisation period asked the subject to begin.

*Wire maze* The maze was constructed from a wire coat hanger that had been bent in a series of curves. It was affixed to a 15 x 25 cm piece of plyboard in a vertical plane. At one end of the maze was a small hook which encircled the coat hanger and which was attached to a handle. The subjects were informed at on the experimenter's command, they were to attempt to move the hook through the maze without touching the coat hanger. If they did, a circuit was completed which activated a tone and a counter attached to the plyboard base in the subjects' view. The subject was told that they should attempt to get through the maze with less than 50 touches. If they completed the maze before the end of the phase, they were instructed to attempt the maze in the opposite direction. Again, the dominant hand was to be used while keeping the nondominant hand as still as possible. The experimenter then left the room and after a stabilisation period asked the subject to begin.

## Results

### *Data reduction*

One of the male atopic dermatitis sufferers and two control subjects (one male, one female) were excluded from the analysis due to equipment failure. For each phase of the experiment, mean scores for each physiological variable were obtained for three periods:

**Baseline** The 10 second period before the start of each experimental phase was ignored due to the possibility of artifactual effects of the experimenter or subject talking and the subject adjusting position to meet the demands of the phase. The preceeding 20 seconds to this provided the baseline levels.

**Time One** A 10 second period after the start of a phase was ignored due to the possibility of postural shifts or other artifacts. The 20 second period immediately following this constituted the first of two readings during each phase.

**Time Two** The final 10 seconds of each phase was ignored and the 20 seconds preceeding this period was utilised as the second reading.

In each case, movement or other artifacts were avoided in the selection of the sections utilised for obtaining readings for the variables. This was achieved by adjusting the exact location of the section to be scored or, in some cases, shortening the time period of the section. This latter strategy was adopted only when the former was not possible.

For each period, the arm skin temperature and digital skin temperature in degrees Celcius recorded during the period were used. If no temperature readings were included in the period, the closest adjoining readings were utilised. Mean heart rate was determined by the calculation of the number of beats in the finger pulse amplitude record expressed as beats per minute. Mean skin conductance level was determined by calculation of the mean level for the period in micromhos ( $\mu\text{mhos}$ ). Finger pulse amplitude was determined by calculating the mean amplitude of the pulses for the period in millimetres. Means for finger blood volume and arm blood volume were calculated by measuring the mean height the record was above or below a predetermined line of the record sheet for that period in millimetres.

Because finger blood volume, finger pulse amplitude, and arm blood volume are not absolute measures, the difference scores for these variables were calculated. This was achieved by subtracting each subject's baseline score for each experimental phase from the Time One and Time Two scores for this phase. This gave two scores for each experimental phase; difference from baseline for Time One and difference from baseline for Time Two. The mean difference scores for the two periods of each phase for the atopic dermatitis sufferers and the controls are shown in Figures 4, 5, and 6 for finger blood volume, finger pulse amplitude, and arm blood volume, respectively. The mean absolute scores for each reading period of each experimental

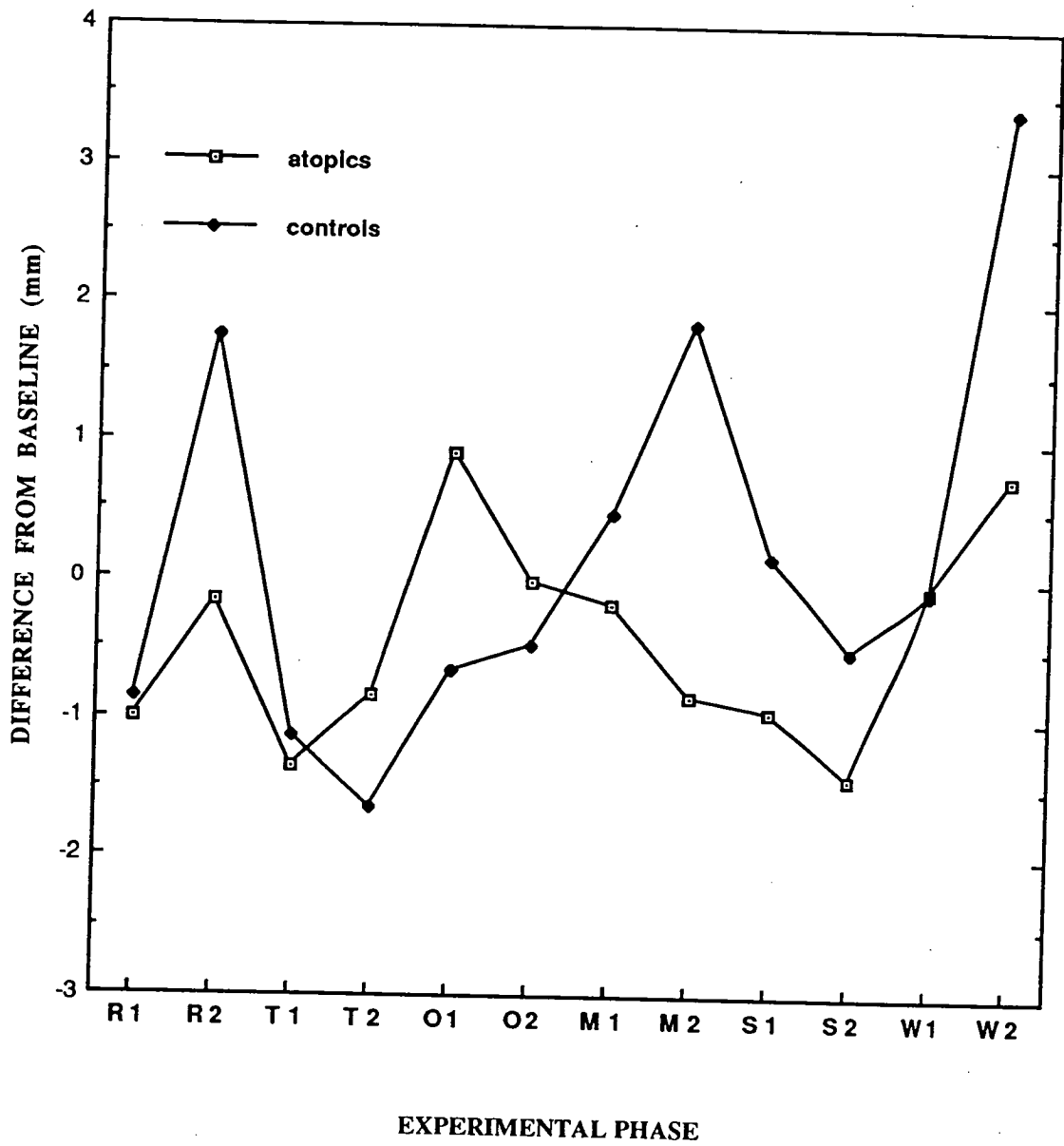
phase for heart rate, skin conductance level, digital skin temperature, and arm skin temperature for the atopic dermatitis sufferers and the controls are shown in Figures 7, 8, 9, and 10 respectively.

Examination of the raw data suggests several differences exist between the groups. First, the heart rate of the atopic dermatitis sufferers is consistently higher than that of the controls, irrespective of the experimental phase. On mental arithmetic which is known to lead to sympathetic arousal, including cardiac acceleration, the atopic dermatitis sufferers display greater reactivity than the controls. If this difference is significant, it would support the hypothesis of atopic dermatitis sufferers having greater sympathetic dominance. Second, the results for digital skin temperature across phases show the atopic dermatitis sufferers as having higher temperatures at all phases. This is not consistent with previous findings, nor is it consistent with a sympathetic dominance hypothesis. This hypothesis predicts that atopic dermatitis sufferers would show vasoconstriction of the finger blood vessels. Examination of reactivity in the various phases shows that while the two groups display a similar reactivity in the time estimation, orienting response, Space Invaders, and wire maze phases, they differ in their reactions in the two other phases. Relaxation is associated with an increase in temperature in the atopic dermatitis sufferers, but a decrease in skin temperature in the controls. For the mental arithmetic task, both groups show an initial fall, but only the atopic dermatitis group continues this fall at Time Two. Therefore, it is only the prolonged reaction of the atopic dermatitis group on the mental arithmetic task that appears to be supportive of the sympathetic dominance hypothesis.

Arm temperatures across the phases are lower for the atopic dermatitis group with one exception; Time Two of mental arithmetic. This lower arm skin temperature supports the hypothesis of sympathetic dominance in blood vessel tone. Reactivity across phases was similar with the exception of Time Two of the mental arithmetic task; the rise for the atopic group was the opposite to that of the control subjects as well as contrary to a sympathetic hyperreactivity hypothesis.

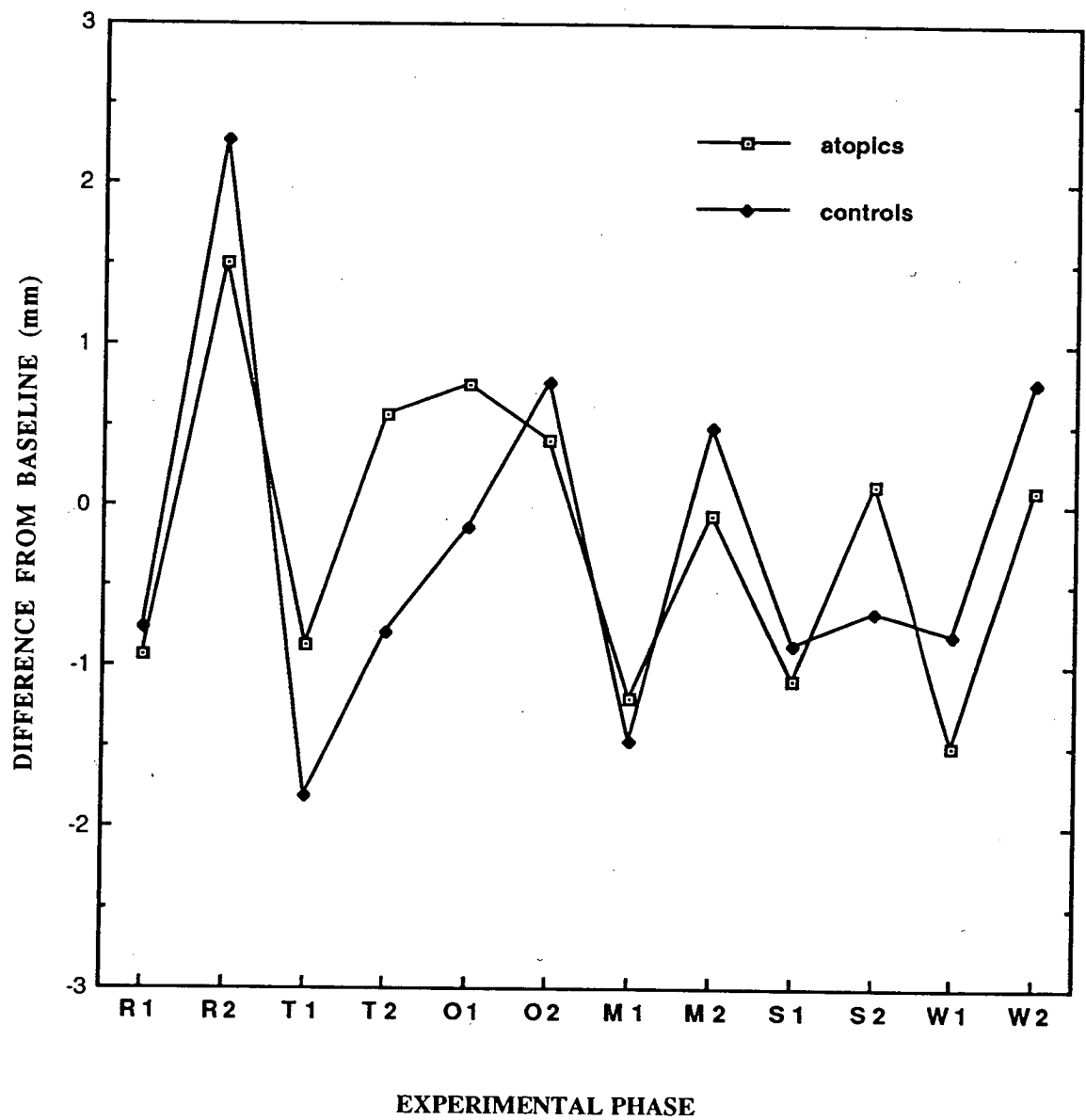
Finger blood volume reactivity across the phases was marked by a differing patterns of response on some tasks. For example, the controls showed vasodilatation in response to the mental arithmetic, while the atopics demonstrated vasoconstriction, a result which does appear to support the sympathetic dominance hypothesis. The atopic dermatitis group showed initial vasodilatation to the orienting task, then vasoconstriction at Time Two while the controls showed the reverse pattern. With regard to arm blood volume, the atopic dermatitis sufferers showed an initial vasoconstriction response to all tasks with the exception of relaxation. With the exception of mental arithmetic, they then showed a vasodilatory response that returned to baseline or greater levels in four of these five conditions. The controls reacted to the start of all conditions with vasodilatation and showed continuing vasodilatation at





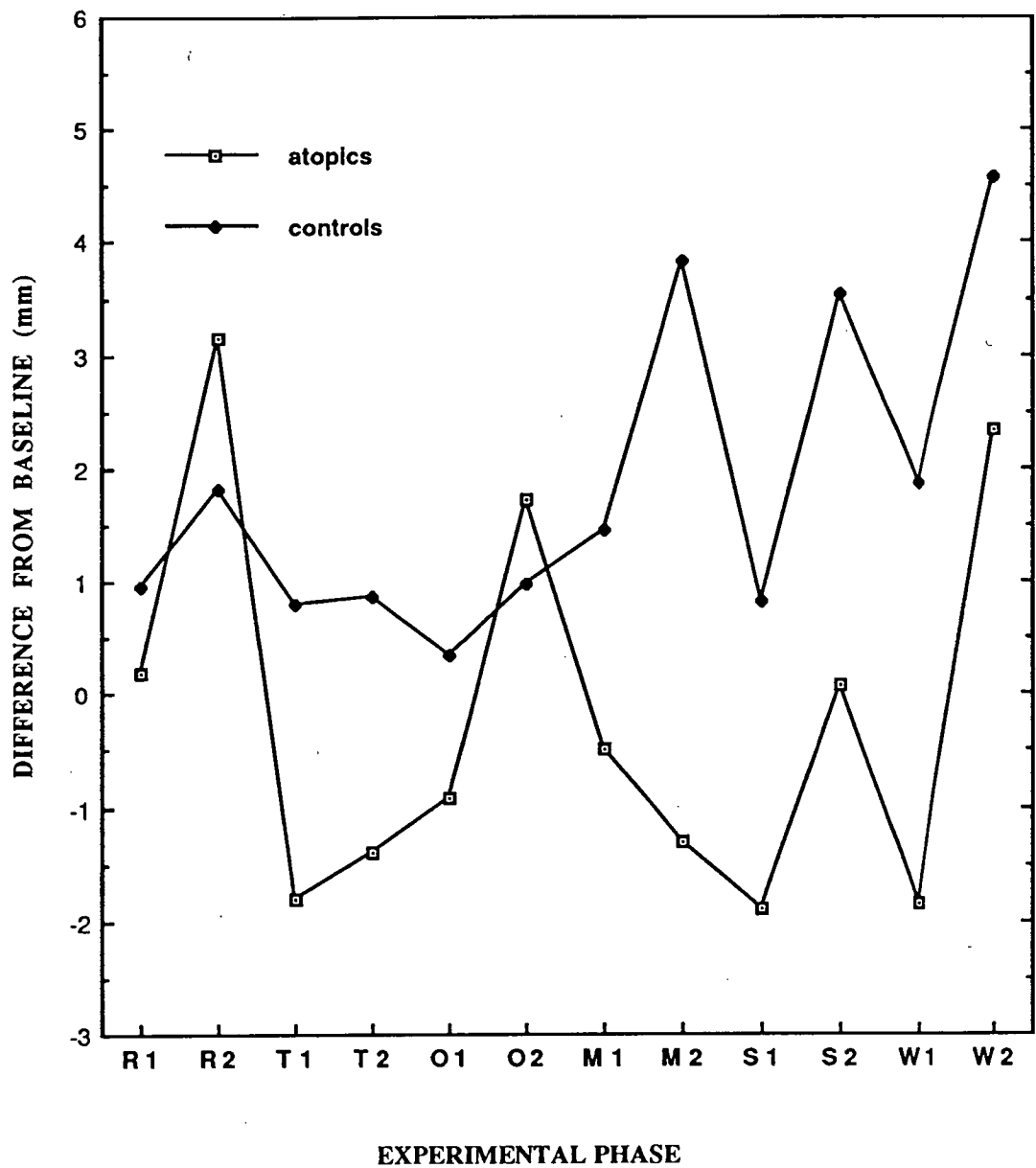
*Figure 4.* Mean difference in finger blood volume from baseline for atopsics and controls for each experimental phase.

*Note.* R = Relaxation, T = Time Estimation, O = Orienting Response, M = Mental Arithmetic, S = Space Invaders, W = Wire Maze, 1 = Time 1, 2 = Time 2.



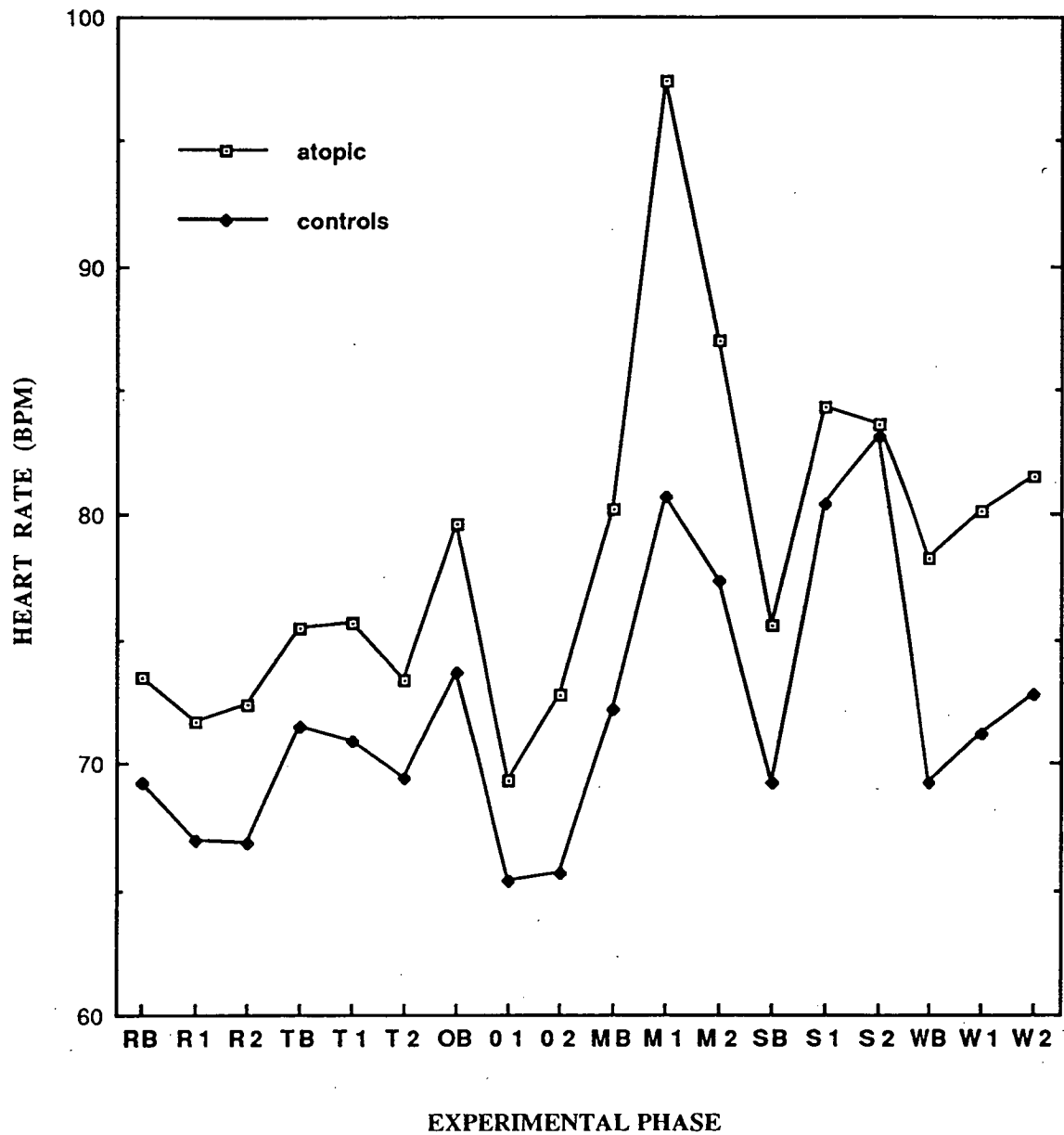
*Figure 5.* Mean difference in finger pulse amplitude from baseline for atopics and controls for each experimental phase.

*Note.* R = Relaxation, T = Time Estimation, O = Orienting Response, M = Mental Arithmetic, S = Space Invaders, W = Wire Maze, 1 = Time 1, 2 = Time 2.

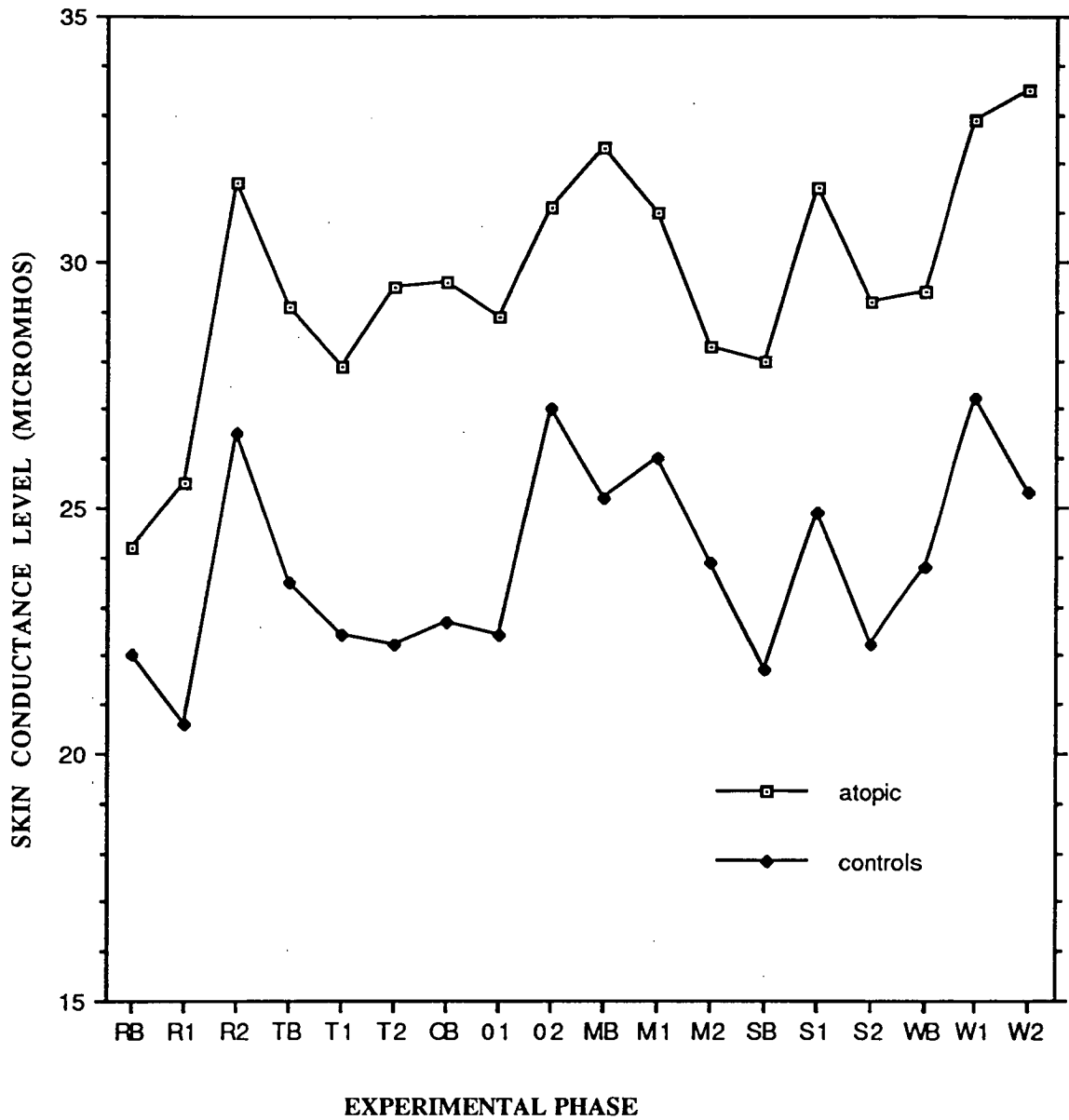


*Figure 6.* Mean difference in arm blood volume from baseline for atopsics and controls for each experimental phase.

*Note.* R = Relaxation, T = Time Estimation, O = Orienting Response, M = Mental Arithmetic, S = Space Invaders, W = Wire Maze, 1 = Time 1, 2 = Time 2.

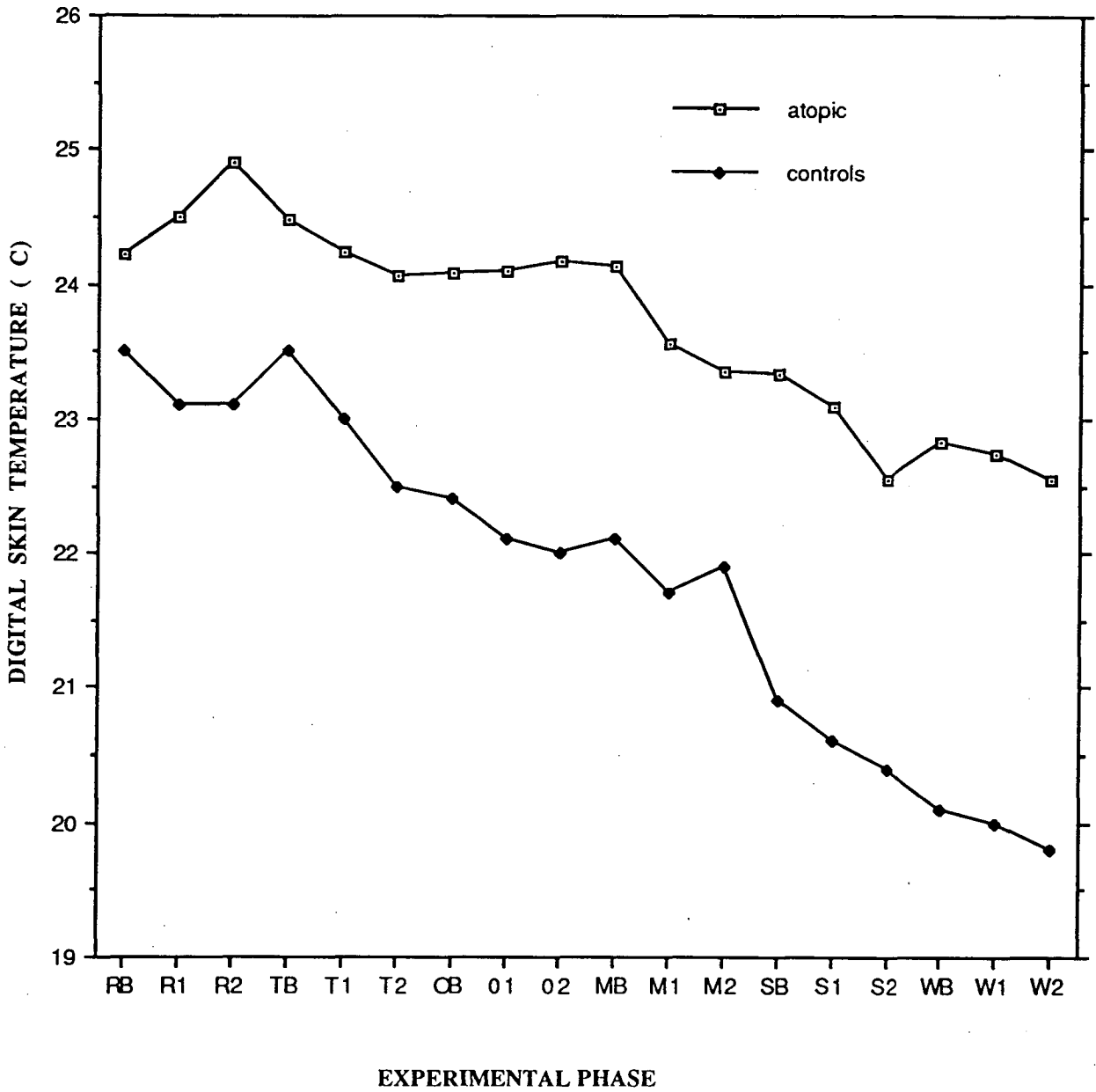


**Figure 7.** Mean heart rate of atopics and controls for each experimental phase.  
*Note.* R = Relaxation, T = Time Estimation, O = Orienting Response, M = Mental Arithmetic, S = Space Invaders, W = Wire Maze, B = Baseline, 1 = Time 1, 2 = Time 2.



*Figure 8.* Mean skin conductance levels for atopics and controls for each experimental phase.

*Note.* R = Relaxation, T = Time Estimation, O = Orienting Response, M = Mental Arithmetic, S = Space Invaders, W = Wire Maze, B = Baseline, 1 = Time 1, 2 = Time 2.



*Figure 9.* Mean digital skin temperature for atopics and controls for each experimental phase.

*Note.* R = Relaxation, T = Time Estimation, O = Orienting Response, M = Mental Arithmetic, S = Space Invaders, W = Wire Maze, B = Baseline, 1 = Time 1, 2 = Time 2.

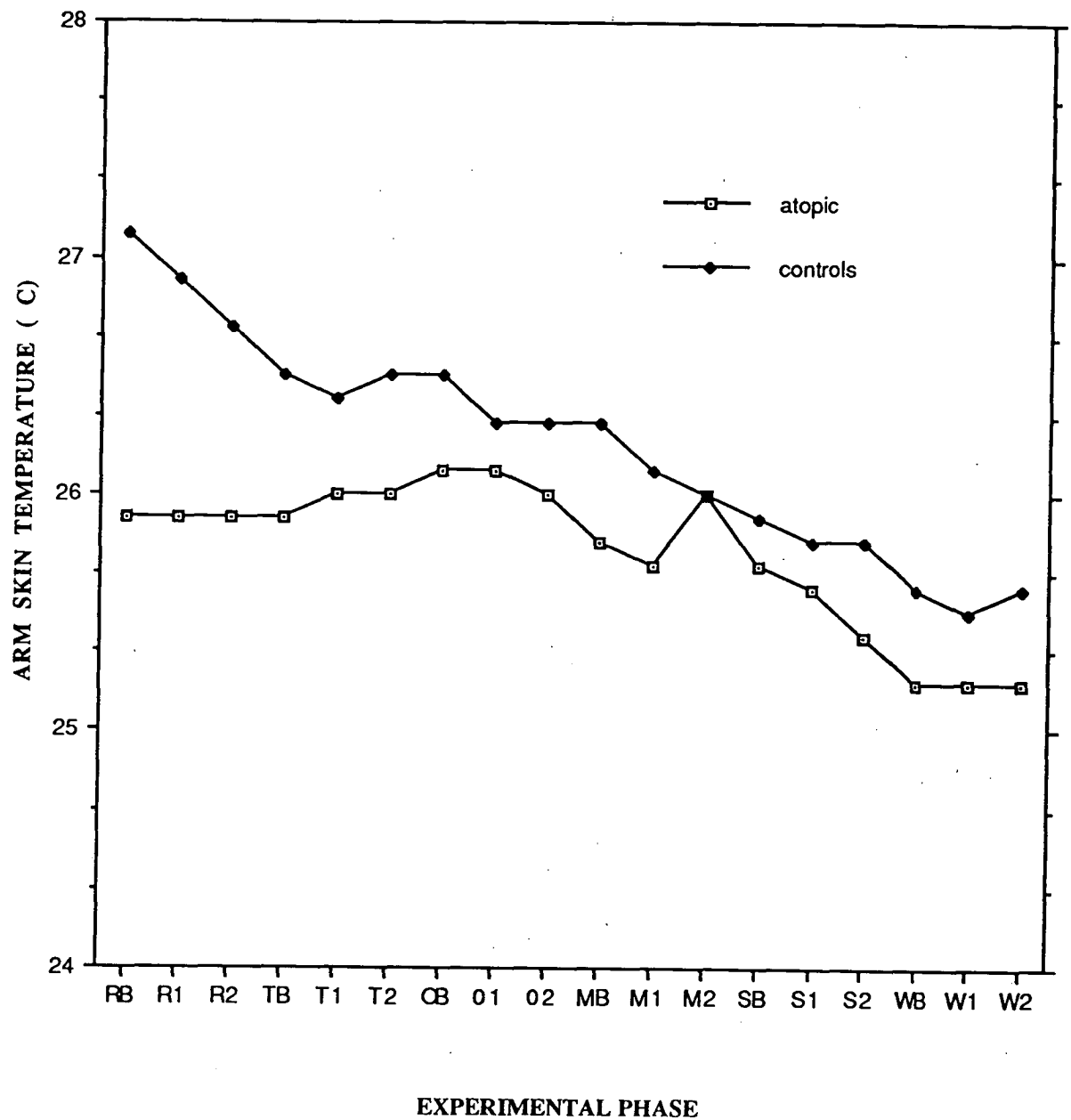


Figure 10. Mean arm skin temperature of atopics and controls for each experimental phase.

Note. R = Relaxation, T = Time Estimation, O = Orienting Response, M = Mental Arithmetic, S = Space Invaders, W = Wire Maze, B = Baseline, 1 = Time 1, 2 = Time 2.

Time Two. Therefore, the arm blood volume means appear to support past findings of sympathetic hyperreactivity in atopic dermatitis sufferers. Finally, the graphs for mean finger pulse amplitude and mean skin conductance level across phases show a pattern that is essentially the same for both groups. Therefore, visual inspection of the graphs suggests that the groups do appear to differ in their responses to the tasks on some of physiological measures. These differences appear to be most consistent for the mental arithmetic task which is known to lead to sympathetic activation. The atopic dermatitis group showed reactivity in heart rate, digital skin temperature, finger blood volume, and arm blood volume which appeared consistent with the hypothesis of sympathetic hyperreactivity. However, such a visual analysis obviously does not take into consideration the variance in the responses of each group.

Table 12 presents the means and standard deviations for each group on the Stress and Arousal subscales of the SACL for each of the experimental phases. The table indicates that the groups rated the phases in similar ways. An exception to this was that the atopic dermatitis sufferers rated the orienting response phase the least stressful, whereas the controls rated both this and the relaxation phase as the least stressful. Differences in ratings for the two phases for the atopic dermatitis group were marginal and nonsignificant. Both groups rated the mental arithmetic task as the most stressful and the Space Invaders task as the most arousing. The two groups differed in the degree of a rating only once; atopic dermatitis sufferers rated the wire maze phase as less arousing than the controls ( $t = 2.54$ ,  $df = 19$ ,  $p < .05$ ).

#### *Statistical analysis*

A major hurdle to any statistical analysis conducted on the data was the large number of repeated measures of seven physiological variables that were not independent of each other. With large sample sizes, this may not present a problem. However, due to the fact that limited atopic dermatitis sufferers were able to be recruited, the current study involved small subject numbers. Therefore, it was necessary to restrict the number of conditions and physiological variables analysed. It was decided to restrict the analysis to three of the experimental phases; relaxation, mental arithmetic, and Space Invaders. Relaxation was chosen in order to test the hypothesis that atopic dermatitis subjects would display higher resting levels of sympathetic arousal. Because both SACL-Stress and SACL-Arousal scores for this condition were the lowest for both groups, this gave support to the assumption that a relaxation phase would provide a more accurate level of resting physiological activity. Mental arithmetic was chosen as it was rated as the most stressful condition by both groups, and Space Invaders because it was rated as the most arousing. Selection of these two phases, which were known to lead to sympathetically-mediated arousal would enable the hypothesis that atopic dermatitis sufferers display greater levels of



Table 12

*Mean Stress Arousal Checklist Scores for Each Experimental Phase for Both Groups*

Experimental phase	Group			
	Atopic Dermatitis ( <i>n</i> = 11)		Controls ( <i>n</i> = 10)	
	Stress	Arousal	Stress	Arousal
Relaxation	3.5 ( <i>SD</i> =1.2)	4.1 (1.1)	2.7 (0.9)	4.5 (1.3)
Time estimation	3.6 (1.8)	4.8 (2.0)	2.6 (1.4)	5.2 (1.7)
Orienting response	3.4 (1.8)	4.9 (1.6)	2.7 (0.7)	4.9 (1.5)
Mental arithmetic	5.5 (2.1)	5.0 (1.7)	6.6 (2.3)	5.8 (0.9)
Space Invaders	3.5 (1.5)	6.5 (1.1)	3.4 (1.3)	6.8 (0.8)
Wire maze	4.5 (1.9)	5.6 (1.0)	4.5 (1.8)	6.6 (0.8)

sympathetic reactivity to be tested. Although it is known to lead to sympathetically-mediated reactivity, the orienting response phase was not selected for this analysis. This was because subjects rated it as neither particularly arousing nor stressful (see Table 12).

The physiological variables heart rate, arm skin temperature, finger blood volume, and skin conductance level were selected for incorporation into the analysis. Heart rate was selected due to its use in previous studies and its value as a measure of general autonomic arousal. Arm skin temperature was selected in favour of arm blood volume as the latter was subject to movement artifacts that made it the least reliable of the measures. Finger blood volume was selected in favour of digital skin temperature in order to maximise the variability of utilised measures. Skin conductance level was selected in order to provide a further commonly used measure of generalised autonomic arousal, as well as a measure that was unconnected with the cardiovascular system. Finger pulse amplitude was not selected due to the fact that it is derived from finger blood volume.

Consistency across measures was achieved by converting the scores for heart rate, arm skin temperature, and skin conductance level to difference from baseline scores in the same manner as that described above for finger blood volume, arm blood volume, and pulse amplitude. Therefore, each variable had two repeated measures for each experimental phase; difference from baseline at Time One, and difference from baseline at Time Two. To enable comparison across measures, these scores were then converted into standard scores (*Z* scores).

The lack of a counterbalancing of the order of experimental phases meant that order effects could not be ruled out. Therefore, separate analyses were conducted for each of the three phases. Repeated measures (physiological measures  $\times$  time) analyses of variance (ANOVA) and multivariate analyses of variance (MANOVA) were performed. The analysis summary tables and MANOVA tables (main effects for Measures and Time; interaction effects for Measures  $\times$  Group, Time  $\times$  Group, Measures  $\times$  Time, and Measures  $\times$  Time  $\times$  Group) for relaxation, mental arithmetic, and Space Invaders are in Appendix I.

No significant main effects or interactions were found with regard to the analyses for relaxation or Space Invaders. These results can be interpreted as indicating that the two groups did not significantly differ in the pattern of response across measures and/ or time on these phases of the experiment. The MANOVA indicated significant Measures (Wilk's Lambda = .183,  $F$  [3, 17] = 25.4,  $p$  = .0001), Time (Wilk's Lambda = .202,  $F$  [1, 19] = 74.9,  $p$  = .0001), and Measures  $\times$  Time (Wilk's Lambda = .037,  $F$  [3, 17] = 149.3,  $p$  = .0001) and Measures  $\times$  Time  $\times$

Group (Wilk's Lambda = .555,  $F [3, 17] = 4.54$ ,  $p < .05$ ) effects for mental arithmetic. The Measures x Group interaction was approaching significance (Wilk's Lambda = .689,  $F [3, 17] = 2.55$ ,  $p = .09$ ).

To further interpretation of the Measures x Time x Group interaction, repeated measures analyses of variance (ANOVA) were conducted examining group differences in the pattern of reactivity across time for each measure separately. The summary tables are included in Appendix J. The ANOVA for heart rate indicated that there was a significant main effect of time on heart rate ( $F [1,19] = 14.28$ ,  $p < .005$ ) and that the Time x Group interaction was close to significant ( $F [1,19] = 3.76$ ,  $p = .068$ ). Greenhouse-Geisser epsilon corrections for repeated measures (Geisser & Greenhouse, 1958) did not alter these values. The interpretation of this is that heart rate reactivity varied across time and the pattern of reactivity across time was close to differing for the two groups. Examination of Figure 7 indicates that heart rate reactivity for both groups increased rapidly at Time One over baseline levels and at Time Two declined to a level that was still above baseline levels. Visual comparison of the slopes suggests the atopic dermatitis sufferers reacted more sharply in Time One than the controls, but also fell more sharply at Time Two.

The arm temperature ANOVA revealed that there was a significant Time x Group interaction ( $F [1,19] = 7.3$ ,  $p < .05$ ). Inspection of Figure 10 indicates that both groups displayed a similar fall in arm temperature from baseline to Time One, but the atopic dermatitis sufferers showed a recovery in temperature between Time One and Two while the controls continued to show a fall.

The finger blood volume ANOVA indicates a significant Time x Group interaction ( $F [1,19] = 6.34$ ,  $p < .05$ ). Examination of Figure 4 indicates that while the atopic dermatitis sufferers showed a tendency towards vasoconstriction across Time One and Two, the controls showed a tendency towards vasodilatation. The skin conductance ANOVA indicated a nonsignificant Time x Group interaction.

### Discussion

To summarise the results of the experiment, the atopic dermatitis sufferers and controls were found not to differ in their pattern of reactivity on the relaxation and Space Invaders phases. On the mental arithmetic task, the MANOVA indicated that significant Measures, Time, Measures x Time, and Measures x Time x group effects existed. The main effect results were interpreted as indicating that a difference existed with regard to subjects' reactivity across measures and that their physiological response varied from Time One to Time Two. The Measures x Time interaction was interpreted as indicating that the pattern of reactivity across time differed depending on the measure. That is, all the measures did not show the same pattern across time. The Measures x Time x Group interaction was interpreted as indicating that the pattern of reactivity across time differed between the measures, and these differences were not consistent across groups. That is, each group was unique in the manner in which the pattern of reactivity of the measures varied across time.

This interpretation was investigated by separate repeated measures ANOVAS for each physiological variable. The two groups were found to differ significantly on their pattern of reactivity across time on arm temperature and finger blood volume. Examination of Figure 10 shows that while both groups displayed a similar fall in arm temperature from baseline to Time One, the atopic dermatitis sufferers showed a rise in temperature between Time One and Two which increased to a level above their prephase baseline. The controls continued to show a fall from Time One to Time Two.

The finger blood volume ANOVA results and examination of Figure 4 indicates that while the atopic dermatitis sufferers showed a tendency towards vasoconstriction across Time One and Two, the controls showed a tendency towards vasodilatation. The heart rate ANOVA indicated a Groups x Time interaction close to significance. Examination of Figure 7 indicates that heart rate reactivity for both groups increased rapidly at Time One over baseline levels and at Time Two declined to a level that was still above baseline levels. Visual comparison of the slopes suggests the atopic dermatitis sufferers showed a greater reaction at Time One than the controls, but also showed a greater degree of decrease in heart rate between Time One and Time Two.

The results of the current study do not support the hypothesis of higher resting levels of sympathetic arousal in atopic dermatitis sufferers. There was no difference between the two groups during the relaxation phase. Examination of the MANOVA results for the relaxation phase in Appendix I indicate that the Measures x Time x Group effect was nonsignificant (Wilk's Lambda = .898,  $F [3, 17] = 2.16, p > .15$ ). This result does not support previous research that has found evidence of higher resting levels of sympathetic arousal in atopic dermatitis for such variables as heart rate (Varonier & Hahn, 1966), diastolic blood pressure (Wenger et al., 1962), and skin

temperature (Abrams & Farber, 1963; Johnson & Winkelmann, 1965). However, with a greater number of subjects, the weak trend observed may have reached significance.

The hypothesis that the atopic dermatitis sufferers would display greater sympathetic reactivity on tasks known to be sympathetically-arousing was partially supported. Mental arithmetic is known to be a task that leads to sympathetically mediated reactions on the part of the cardiovascular system. It had been predicted that atopic dermatitis sufferers would display reactivity on this task consistent with a pattern of sympathetic hyperreactivity. Such hyperreactivity would predict greater increases in heart rate and greater vasoconstriction of blood vessels as indicated by falls in finger blood volume, and higher skin conductance levels. The atopic dermatitis sufferers show a pattern of reactivity across time that is different from the controls on finger blood volume and arm skin temperature, and a close to significant difference on heart rate. Their finger blood volume response is one of constriction and their heart rate at Time One appears to be one of greater increases. With regard to arm skin temperature, after an initial fall in skin temperature; the arm skin temperature of the atopic dermatitis sufferers began to rise. This rise at Time Two is greater than the skin temperature at prephase baseline. In contrast, the controls show a continued fall in skin temperature across time. This result will be discussed later. No differences were found between the two groups with regard to the other sympathetically arousing task, Space Invaders. Subjects rated this as the most arousing task but did not rate it as being as stressful as mental arithmetic or the wire maze. It is possible that the perception of the stressfulness of the task is an important determinant of reactions and may warrant further investigation. Therefore, these results only provide partial support the hypothesis that atopic dermatitis sufferers show greater sympathetic reactivity. Such a finding also only provides partial support for the previous research that has found evidence of greater sympathetic reactivity for the variables of blood pressure (Eyster et al., 1952), heart rate (Wenger et al., 1962), and skin temperature (Eyster et al., 1952; Johnson & Winkelmann, 1965).

The results for the mental arithmetic phase also provide partial support for the hypothesis that the atopic dermatitis sufferers would display evidence of symptom specificity. It was hypothesised that the atopic dermatitis subjects would exhibit increased sympathetic reactivity in heart rate but also in those variables related to the skin and the peripheral vascular system such as skin conductance and finger blood flow. This hypothesis was not supported in relation to skin conductance but was with regard to finger blood flow.

The reaction of the atopic dermatitis sufferers with regard to arm skin temperature on the mental arithmetic task also supports the hypothesis of symptom specificity. The results for arm skin temperature on the mental arithmetic task support

the hypothesis that atopic dermatitis sufferers would display evidence of vasodilatation in their affected skin in response to stressful tasks. After an initial fall in skin temperature; probably the result of an orienting-type reaction; the arm skin temperature of the atopic dermatitis sufferers began to rise. This rise at Time Two is greater than the skin temperature at prephase baseline. In contrast, the controls show a continued fall in skin temperature across time. This reaction is consistent with other research. D.T. Graham and Wolf (1953) found that discussing the events in their lives that were associated with exacerbations of their skin, atopic dermatitis sufferers displayed a rise in skin temperature and a decrease in minute blood vessel tone. Vasodilatation was noted by D.T. Graham, Goodell, and Wolff (1957) and Gaul and Underwood (1950) to be accompanied by sensations of itch. D.T. Graham and Wolf (1953) found that the response of vasodilatation was often associated with itching and scratching on the part of their subjects. Therefore, the subjects in the current study reacted to the task that was rated as the most stressful with a vasodilatory response in their affected skin. Because vasodilatation is associated with a lowering of the itch threshold (D.T. Graham, Goodell, and Wolff, 1957), the response could be viewed as being consistent with their skin disorder.

This reaction was not a stimulus-specific one because the controls reacted with a different pattern of response to the same task. Therefore, it could be seen as evidence supporting symptom specificity in atopic dermatitis sufferers. However, symptom specificity is a principle that is reflected in patterns of reactivity across tasks, taking into account stimulus-response specificity. The same pattern was not observed in other phases. However, if subjects react to other stressors with a similar pattern of vasodilatation in areas of affected skin, it provides a potential mechanism by which stressful events may exacerbate skin symptoms. Examination of the graphs indicate that the atopic dermatitis sufferers did not show the same pattern of reactivity in the wire maze task which was rated as the second most stressful. However, a *t*-test of the SACL-Stress for this task revealed that subjects viewed it as nearly significantly less stressful ( $t = 1.83$ ,  $df = 19$ ,  $p = .08$ ). Other factors may affect the responses; motivational-specific factors are an obvious example. D.T. Graham and Wolf (1953) found that vasodilatation occurred when subjects were frustrated but not at other times. The subject's emotional state other than stress was not assessed in this study; their response to the mental arithmetic task may have differed from other phases. This is a factor that deserves attention in further studies.

The finding of increased sympathetic reactivity of atopic dermatitis sufferers to mental arithmetic provides partial support to the psychobiological conceptualisations of Faulstich and Williamson (1985) and Koblenzer (1987, 1988). These researchers stated that atopic dermatitis sufferers would display such reactivity. The absence of a

difference between the atopic dermatitis sufferers and controls with regard to reactivity on Space Invaders and the lack of a difference with regard to resting levels of sympathetic arousal are not supportive of these conceptualisations.

This study also attempted to address the issue of psychophysiological response specificity. Lipowski's (1977) biopsychosocial approach to psychosomatic medicine had identified this as an important factor in this conceptualisation. The current study's results with regard to the response of atopic dermatitis sufferers to the mental arithmetic phase provides partial support for the presence of individual-response stereotypy in the form of increased sympathetic reactivity and symptom specificity reflected in increased reactivity in the peripheral vascular system. This symptom specificity was reflected by greater vasoconstriction in the hand and vasodilatation in the affected skin during a stressful task. As stated earlier, this latter finding is of particular interest given its consistency with the findings of D.T. Graham and Wolf (1953) and the relationship between vasodilatation and lowering of the itch threshold.

In summary, this study advances our understanding of psychophysiological reactivity in atopic dermatitis in a number of ways. First, it provides some support for the existence of increased sympathetic reactivity in atopic dermatitis sufferers. Second, by virtue of this finding, it provides partial support for the psychobiological conceptualisations of Faulstich and Williamson (1985) and Koblenzer (1987, 1988) which proposed that atopic dermatitis sufferers displayed such reactivity. Third, it provides evidence to support the existence of both individual-response stereotypy and symptom specificity patterns of reactivity. These findings are consistent with Lipowski's (1977) biopsychosocial conceptualisation. Fourth, the finding of vasodilatation in the affected skin in response to a stressful task is a reaction consistent with both the observations of previous researchers (D.T. Graham & Wolf, 1953; Kepecs, Robin, & Brunner, 1951) and the physiology of the disorder (Bystryń & Hyman, 1969). As stated earlier, this may be a mechanism by which stressful events exacerbate skin symptoms.

This study has limitations, however. The presentation of phases was not counterbalanced and subject numbers were low, flaws that equal the seven deadly sins of some psychophysiological research described by Gale and Edwards (1986). The study also did not control for stage of menstrual cycle in the female subjects. This has been shown by some authors (e.g., Kaplan, Whitsett, & Robinson, 1990) but not others (e.g., Stoney, Owens, Matthews, Davis, & Caggiula, 1990) to be a potential confounding factor. As many subjects in the experiment were female, this is an important factor. The issue of delayed recovery of response was not analysed in this study. This had been identified in some studies reviewed (Eyster et al., 1952; Faulstich et al., 1985; Johnson & Winkelmann, 1965) as being of importance. This issue requires further investigation.

Further examination of the patterns of reactivity of atopic dermatitis sufferers to mental arithmetic and other stressors is needed, particularly of physiological variables that are consistent with the symptoms of the disorder. The results suggest that investigation of reactivity in the affected skin in terms of blood volume and skin temperature may provide further understandings of psychophysiological reactivity in atopic dermatitis.



**CHAPTER 7**  
**SUMMARY AND CONCLUSIONS.**

As stated in chapter 1, the overall purpose of this thesis was to investigate key issues related to the psychological aspects of the three psychobiological conceptualisations of atopic dermatitis of Whitlock (1976), Faulstich and Williamson (1985), and Koblenzer (1987, 1988). In particular, its aim was to examine those aspects identified by the approaches as being of importance but for which the empirical support is lacking, inadequate, or flawed as well as to examine those areas of divergence between the conceptualisations. In addition, the research also aimed to investigate atopic dermatitis in the light of the key influences on modern psychosomatic theory identified by Lipowski (1977). He had stated that

Current psychosomatic theory has been influenced by general systems theories, the doctrine of multicausality of somatic functions and behaviour, notions of psychophysiological response specificity and activation, the theory of operant conditioning and self-control of visceral functions, the hypothesis of object loss as an antecedent of disease, and by the concepts of psychosocial stress, cognitive appraisal and meaning, individual susceptibility to disease, adaptation, coping, and feedback (Lipowski, 1977, p. 236).

While many of these influences such as the doctrine of multicausality of somatic functions have been included within the three psychobiological conceptualisations of atopic dermatitis, some have not been not addressed. Of particular importance among these is the conceptualisation of stress in terms of appraisal and coping processes as proposed by Lazarus (e.g., Folkman & Lazarus, 1980). Therefore, the current research attempted to investigate the role of these influences in atopic dermatitis.

A central contention of all three of the psychobiological conceptualisations is that atopic dermatitis is a multifactorially determined disorder and that stress plays an important role in the course of the skin disorder. However, as the review in chapter 2 indicated, the evidence supporting the role of stress is limited. Retrospective interviews studies have found emotional stress to precipitate exacerbations of atopic dermatitis in approximately 70 % of cases. On the other hand, studies utilising life events and daily hassles as measures of stress have not found evidence of an association. However, limitations exist with both of these approaches. Therefore, the first two studies in the thesis sought to examine the relationship between stress and atopic dermatitis.

In the first study, fifty atopic dermatitis sufferers completed a daily diary for a fortnight, recording their emotional state and skin condition. The hypothesised positive relationship between stress and increases in skin symptoms was confirmed. While

only twelve of the subjects displayed a significant positive relationship between stress and skin symptoms, meta-analysis of the results revealed that the pattern of obtained results was significantly different from that expected by chance. Even those subjects who stated that stress did not affect the course of their skin symptoms displayed a similar result, though to a lesser degree of significance. A similar pattern was found for the relationship between depression and skin symptoms. Further examination revealed that while reports of anxiety and tension showed the strongest relationship with skin symptoms, other specific emotions showed positive relationships. Therefore, the hypothesis that the relationship between emotional states and skin symptoms would be nonspecific was confirmed. Lag sequential analyses indicated that interpersonal stress on Day X predicted skin condition on Day X+1 and that this relationship was reciprocal. This suggested that not only did higher levels of stress on Day X lead to increased skin symptoms on Day X+1, but the presence of skin symptoms would lead to increased stress on the following day. Further lag sequential analyses indicated that skin symptoms predicted increased depression on the following day but that the reverse relationship did not exist. Due to the fact that both stress and skin symptoms were measured through self-report, it was possible that the relationship was the result of the association of both report of stress and skin symptoms with a third factor such as neuroticism. However, further analysis suggested that this was not the case. Therefore, the hypotheses of the first study were supported; stress was found to exhibit a positive relationship with the symptoms of atopic dermatitis.

The finding of a positive association between stress and atopic dermatitis was consistent with those studies utilising retrospective interviews that found evidence of such an association (e.g., D.T. Graham & Wolf, 1953; Greenhill & Finesinger, 1942; Whittkower & Edgell). It was also consistent with the findings of the long term study by Rush et al. (1957) which utilised therapy sessions and interviews to trace the course of skin symptoms in a small group of subjects. It was not supportive of those studies employing life events (Gil et al., 1987; Wyler et al., 1971) or daily hassles (Gil et al., 1987) which found no such association. The finding that the relationship between emotions and exacerbations and skin symptoms was nonspecific failed to support those researchers who believed a specific emotion such as frustration (Grace & Graham, 1952) or suppression of anger (Greenhill & Finesinger, 1942) was associated with exacerbations.

The second study added further support to association between stress and atopic dermatitis. In this study, the relationship between stress and skin symptoms was examined in atopic dermatitis subjects undergoing a known stressful event, university end of year examinations. It was hypothesised that a positive relationship between stress and skin symptoms would be found and that the day before an examination and the actual day of the examination would be associated with higher levels of skin

symptoms than nonexamination days. These hypotheses were examined by having 15 university students with atopic dermatitis complete a version of the diary utilised in the first study each night over their examination period. Ten of the subjects also completed another measure of stress, the Stress-Arousal Checklist, each night. Of the 13 subjects who completed the diaries correctly, there was a positive relationship between Interpersonal Stress and skin symptoms for five subjects, with this relationship reaching significance for two subjects. The belief that university examinations were largely noninterpersonal stressors was supported by the findings for the SACL. Of the eight subjects who completed this questionnaire, six showed a positive relationship between the Stress scale and skin symptoms. Of these six, two showed a significant relationship and one was close to significant. When the pattern of results of the 13 subjects were analysed through meta-analysis, it was found that the relationship between Interpersonal Stress and skin symptoms, and SACL-Stress and skin symptoms were both significantly different from the pattern expected by chance. These results meant the first hypothesis was confirmed, adding further support for the relationship between stress and exacerbations of atopic dermatitis. Therefore, the findings of the first two studies supported the inclusion of stress as a factor within each of the psychobiological conceptions of atopic dermatitis. This point will be returned to later.

While subjects did not rate examination days as more stressful in terms of Interpersonal Stress, and only approaching significantly more stressful in terms of SACL-Stress, the second hypothesis of this study was also supported. Of 12 subjects, four showed a pattern of significantly higher skin symptoms on examination days and lower skin symptoms on nonexamination days. This pattern was close to significant for a further two subjects. Again, this suggested that a positive association existed between stress and exacerbations of the skin condition. A further aim of this study was to investigate the relationship between stress and atopic dermatitis from the perspective of Lazarus' (Folkman & Lazarus, 1980) transactional theory of stress. This approach emphasises the relationship between the person and the environment in determining stress. In particular, the processes of appraisal of the situation and availability of coping resources are integral to the determination of whether an event is considered stressful. As Folkman and Lazarus (1986) had investigated appraisal and coping processes in university students undergoing examinations, it was possible to investigate whether the subjects in the second study demonstrated similar appraisal and coping strategies. In addition, the relationship between these processes and skin symptoms was examined. Based on the limited previous research investigating the relationship between appraisal and coping processes and the development of skin symptoms, three hypotheses were proposed. First, it was hypothesised that students who perceived an imminent examination as threatening would experience higher levels

of skin symptoms. Second, it was hypothesised that greater use of the coping strategies of self-blame and wishful thinking would lead to increases in skin symptoms. Conversely, use of planful problem-solving and positive reappraisal was predicted to lead to fewer skin symptoms.

To test these hypotheses, eight of the subjects completed the appraisal questions and appraisal emotion scales developed by Folkman and Lazarus (1986) for their study, together with the revised version of the Ways of Coping Checklist (Lazarus & Folkman, 1984) on the night before each examination. The subjects in the study perceived the examinations in a similar manner to the subjects of Folkman and Lazarus (1986) with the exception that they saw them as being less harmful and of higher benefit. With regard to the usage of coping strategies, both sets of subjects displayed a broadly similar pattern. Strategies involving planful problem-solving, wishful thinking and distancing were used to a greater degree while self-blame was used relatively infrequently. The subjects of Folkman and Lazarus (1986) tended to utilise social supports to a greater degree than the atopic dermatitis subjects, however.

The attempt to investigate the relationship between appraisal, coping, and skin symptoms was unsuccessful. Despite utilising statistical means to control for dependency in the data so that more than one examination per subject could be utilised, the aims were overly ambitious for the number of subjects. After controlling for dependence in the data, none of the appraisal questions, appraisal emotions, or coping strategies showed a relationship to skin symptoms. Those coping strategies that showed a trend towards prediction of skin symptoms were not those hypothesised to do so. It was concluded that the relationship between skin symptoms and appraisal and coping had not been adequately tested and further experimentation with much larger numbers of subjects was required.

The literature on the relationship between personality and emotional features and atopic dermatitis was reviewed in chapter 4. This research was divided into four broad categories; those studies that employed psychodynamic and psychoanalytic approaches, those that investigated the role of maternal rejection during infancy, those studies that sought to find a specific personality profile, and those studies that employed psychometric tests to investigate personality structure and emotional states. The review concludes that there is considerable inconsistency in the findings of these various approaches and that many studies are flawed methodologically. The existence of a single personality type associated with atopic dermatitis was not supported. More support was found for the existence of distinct subtypes of personalities. A number of researchers (e.g., D.G. Brown, 1967, 1972; Kalz et al., 1954; Kepecs, Rabin, & Robin, 1951; Whittkower & Edgell, 1951) described similar subgroups; one showing a tendency towards emotional constriction, and denial of anger or hostility, the other showing a tendency towards a more emotionally reactive pattern. The psychometric

test studies in particular indicated that a number of features such as increased neuroticism, depression, anxiety, and suppressed hostility were associated with atopic dermatitis compared to normal skin disorder free controls. A meta-analysis of suitable studies confirmed these findings. However, a number of studies reviewed in the chapter indicated that interrelationships existed between these features that had not been considered by researchers. Furthermore, these features were not unique to atopic dermatitis sufferers but were found to be associated with a number of other psychosomatic disorders. This finding suggested that atopic dermatitis sufferers displayed a similar pattern to that identified by H. Friedman and Booth-Kewley (1987) as the disease-prone personality.

Based on the results of this review and meta-analysis, a study examining personality and emotional factors in atopic dermatitis was conducted. A number of hypotheses were proposed. First, it was hypothesised that two distinct subgroups of atopic dermatitis sufferers would exist. The first of these were hypothesised as displaying a suppression of strong emotion characterised by reporting of less anxiety, depression, and less dependency needs. They were also hypothesised to deny aggression rather than displaying it. Based on D.G. Brown's (1967, 1972) work, this subgroup was hypothesised to report lower levels of neuroticism and to deny the role of stress in their skin symptoms. The low neuroticism level was thought to be the pivotal feature of this group due to the relationship of the other features to this variable. The second subgroup were hypothesised to report high levels of neuroticism, and high levels of anxiety, depression, and dependency. In contrast to the first group, they were hypothesised to direct their aggression inwards rather than denying it.

The second set of hypotheses proposed related to the comparison between atopic dermatitis sufferers and skin disorder free controls. It was argued that differences between these two groups was dependent on atopic dermatitis subgroup membership. Specifically, it was hypothesised that the second subgroup of atopic dermatitis sufferers would report higher levels of neuroticism, state and trait anxiety, depression, dependency, and inwardly directed hostility than the skin disorder free controls. In contrast, the first subgroup of atopic dermatitis sufferers were hypothesised to report lower levels of neuroticism than skin disorder free controls, and to deny the existence of hostile feelings to a greater extent. Similar differences were predicted to exist between the two subgroups of atopic dermatitis sufferers and a group of skin disorder controls. Finally, the interrelationships found to exist in previous research (e.g., Liakos et al., 1977) between neuroticism and anxiety, depression, dependency, and inwardly directed aggression, and between depression and dependency were predicted to exist. Fifty atopic dermatitis sufferers were compared to 20 subjects with ichthyosis and 35 skin disorder-free controls on a range of personality and emotional state

measures. The atopic group was divided into two groups on the basis of whether subjects believed stress affected their symptoms. As predicted, the nonstress atopic subgroup were found to report less neuroticism, less emotional reliance on others and less trait anxiety than the stress atopics. The results for depression were nonsignificant but in the predicted direction. They also showed a higher internal locus of control with regard to control over social systems than the stress atopic subgroup. The predicted differences regarding expression of aggression were not found but the low reliability of the Rosenzweig Picture-Frustration Study's category of inwardly directed aggression or intraggression may have played a role. These findings supported the previous research of D.G. Brown (1967, 1972), Kalz et al. (1957), Kepecs, Rabin, and Robin (1951) and Whittkower and Edgell (1951) regarding the existence of two distinct subgroups of atopic dermatitis sufferers. In particular, the results were supportive of D.G. Brown's (1967, 1972) observations that levels of neuroticism and denial of the role of stress were pivotal differences between the subgroups. The proportions of subjects comprising these subgroups were slightly different from those obtained by Brown; one quarter of subjects comprised the subgroup similar to his Superstable group rather than the predicted one-third.

Contrary to the hypotheses, the stress atopic subgroup did not differ from the skin disorder free controls on any measure. The only other differences found were that the nonstress atopic dermatitis subjects reported lower neuroticism levels than the two control groups, and the ichthyosis sufferers reported more assertion of their autonomy and less conformity in their responses to frustrating circumstances than the other groups. Such findings fail to support the results of previous research utilising psychometric tests, as well as the results of the meta-analysis conducted in chapter 4. This may have been due to the raised neuroticism score in the skin disorder free controls. As stated earlier, neuroticism was the pivotal feature and other variables such as anxiety, depression, and dependency have been shown to be related to this variable. These results also fail to support H. Friedman and Booth-Kewley's (1987) concept of a disease-prone personality which they had found in relation to other psychosomatic disorders. The features of this disease-prone personality closely resembled those that distinguished the two subgroups of atopic dermatitis sufferers. Again, the raised level of neuroticism in the skin disorder free subjects may account for the lack of support for a difference between the stress atopic subgroup and the normals in terms of the disease-prone personality.

In chapter 6, the findings of a psychophysiological study involving atopic dermatitis sufferers was reported. All three of the psychobiological conceptualisations of atopic dermatitis considered psychophysiological mechanisms to be important in atopic dermatitis. Whitlock (1976) felt that emotional factors may alter the abnormal state of the atopic skin by influencing the allergic response, by reducing itch thresholds

through vasodilatation and sweating, or by the initiation of spontaneous itching through an unspecified central process. Faulstich and Williamson (1985) argued that their research (Faulstich et al., 1985) and that of Garrie et al. (1974) indicated that atopic dermatitis sufferers displayed increased anxiety. As many of the features of anxiety are mediated through the sympathetic nervous system, they argued that stress and anxiety may lead to the pathophysiological features of atopic dermatitis through sympathetic arousal. Koblenzer (1987, 1988) also drew on Faulstich et al.'s (1985) findings of increased sympathetic arousal in atopic dermatitis sufferers. She suggested a link between this increased sympathetic tone and increased alpha-adrenergic and cholinergic activity. This would, in turn, lead to greater histamine release and the development of pruritus. This proposal was consistent with Sventivanyi's (1968) beta-blockade theory of the atopic disorders.

Reviews of psychophysiological studies conducted on atopic dermatitis indicated that the evidence regarding the existence of the increased sympathetic activity proposed by Faulstich and Williamson (1985) and Koblenzer (1987, 1988) is inconsistent. Therefore, a psychophysiological study was conducted in order to investigate this issue further. Four major hypotheses were proposed. First, it was hypothesised that atopic dermatitis sufferers would show greater resting levels of sympathetic arousal than matched controls. Second, it was hypothesised that they would show greater sympathetically mediated reactivity on tasks such as the orienting response, playing a video game, and mental arithmetic which were known to have sympathetic activating effects. Third, it was hypothesised that the atopic dermatitis sufferers would display evidence of symptom specificity in their patterns of reactivity. It was hypothesised that they would display greater reactivity in variables related to the skin such as skin conductance and temperature, and blood flow. Lastly, it was hypothesised that they would display vasodilatory responses at the sites of affected skin in response to stressful tasks compared to matched controls. This last hypothesis was consistent with the findings of D.T. Graham and Wolf (1953) who found that atopic dermatitis sufferers showed a vasodilatory response in their affected skin when discussing emotionally arousing topics. It was also consistent with the findings of D.T. Graham, Goodell, and Wolff (1957) who found that vasodilatation was associated with a lowering of itch thresholds as well as the research by Kepecs, Robin and Brunner (1951) on exudation rates from blisters and Kalz et al. (1957) regarding flare responses in relation to emotionally arousing topics.

The eleven atopic dermatitis sufferers failed to show the hypothesised higher levels of resting sympathetic arousal than ten matched controls though there was a nonsignificant trend in this direction. This finding did not support those studies which had found evidence of higher resting levels of sympathetic activity in atopic dermatitis (e.g., Abrams & Farber, 1963; Varonier & Hahn, 1966; Wenger et al., 1962).



Evidence of increased sympathetic reactivity was found with regard to the mental arithmetic task but not the video game, as was evidence supporting the existence of symptom specificity. The atopic dermatitis subjects displayed a higher heart rate and greater vasoconstriction in the form of reduced blood flow to this task, as well as an increase in arm skin temperature at the site of the affected skin. This partial evidence of increased sympathetic reactivity is consistent with previous studies that have found evidence of such reactivity (e.g., Eyster et al., 1952; Johnson & Winkelmann, 1965; Wenger et al., 1962). The finding that this increased reactivity is also reflected in variables related to the skin and peripheral vascular system such as finger blood flow and arm skin temperature adds to the limited evidence that exists for symptom specificity in atopic dermatitis such as Eyster et al. (1952) and Johnson and Winkelmann's (1965) finding of lower skin temperature in response to the cold pressor. The finding that the atopic dermatitis subjects displayed a rise in arm skin temperature in response to the mental arithmetic task provided partial support for the hypothesis that atopic dermatitis sufferers may display vasodilatation in their affected skin in response to stressful stimuli. It was consistent with the research of D.T. Graham and Wolf (1953) as well the observations of Kalz et al. (1957) and Kepecs, Rabin, and Brunner (1951) on phenomenon in the skin following discussion of emotionally arousing topics. As vasodilatation is known to lower the itch threshold (D.T. Graham, Goodell, & Wolff, 1957), this observation is consistent with the symptoms of the skin disorder and may indicate a potential mechanism by which stress leads to an increase in skin symptoms.

To summarise, the series of experiments reported in this thesis obtained several significant results. The first two studies found evidence consistent with the proposal that stress leads to an exacerbation of symptoms in atopic dermatitis. Although all three of the psychobiological conceptualisations of atopic dermatitis suggest that stress affects the course of skin symptoms, the evidence for this has been limited mainly to studies based on retrospective interviews. As was indicated in chapter 2, this approach is limited by potential biases in recall. More objective approaches such as life events and daily hassles failed to show evidence of an association between stress and skin symptoms. Therefore, the two diary studies provide stronger evidence of such an association than has been demonstrated in the past. However, an attempt to demonstrate such a relationship in terms of Lazarus' (Folkman & Lazarus, 1980) transactional approach to stress was unsuccessful. As this conceptualisation reflects contemporary views of stress, demonstration of such an association in terms of the relationship between appraisal and coping processes and skin symptoms appears essential. This point will be returned to later.

The third study in this series investigated the relationship between various personality and emotional factors and atopic dermatitis. While no differences were

reported between subjects with atopic dermatitis and skin disorder free controls, supporting evidence was found for the concept of distinct subgroups of atopic dermatitis sufferers. Consistent with previous research, these subgroups differed in terms of their degree of neuroticism, trait anxiety, dependency, and sense of control over social systems. Examination of the interrelationships between these factors indicated that one factor, neuroticism, was of key importance in the distinction between these subgroups.

The fourth study in the series found partial support for the existence of a pattern of individual-response stereotypy in atopic dermatitis sufferers in the form of increased sympathetic reactivity. While some evidence from previous research existed for this pattern, it was limited in nature and inconsistent. The results also provided partial support for a symptom specificity pattern of reactivity as well. Again, limited and inconsistent evidence existed previously for such a pattern. While not showing conclusively that such patterns of reactivity exist, the results of this study add some weight to the body of evidence. Perhaps of more importance is the finding that the atopic dermatitis sufferers displayed a rise in arm skin temperature, reflecting vasodilatation, in the area of their affected skin while performing a stressful task. The relationship between vasodilatation and lowering of itch thresholds in skin (D.T. Graham, Goodell, & Wolff, 1957) suggests this finding may point to a potential pathway by which stress may lead to an increase in skin symptoms.

One possible relationship between stress and physiological reactivity is suggested by findings of Gannon, Banks, Shelton, and Luchetta (1989). They investigated the degree of psychophysiological reactivity during and after a laboratory stressor (mathematical and word problems) and the extent to which this reactivity mediated the relationship between recent life stress (hassles) and psychological and psychosomatic symptoms in undergraduate students. They found that psychophysiological reactivity during or recovery after the stressor was not directly associated with symptoms of illness. However, those individuals with greater reactivity or slower recovery exhibited a stronger relationship between environmental stress and symptoms compared to subjects who were less reactive or faster to recover. In other words, these individuals did not cope successfully with environmental stress. This suggested that a buffering type model existed where lower levels of physiological reactivity provided protection from the adverse effects of stress. Gannon et al. (1989) concluded that reducing the degree or duration of this reactivity or recovery from stress may reduce its impact on health. This point will be discussed later with regard to the implications of the current series of studies on the treatment of atopic dermatitis.

#### *Implications of findings to the psychobiological conceptualisations*

It was stated in chapter 1 that the overall purpose of this thesis was to investigate key issues related to the psychological aspects of the three psychobiological

conceptualisations of atopic dermatitis. In particular, it was stated that the thesis would examine those aspects identified by the approaches as being of importance but for which empirical support is lacking, inadequate or flawed. In doing so, it would be possible to assess the adequacy of the conceptualisations as they currently stand as well as highlight areas requiring revision or further research.

All three of the psychobiological conceptualisations stated that a relationship existed between stress and increases in skin symptoms. Whitlock (1976) and Faulstich and Williamson (1985) both felt that stress led to such increases through psychophysiological processes. Koblenzer (1987, 1988) also felt that stress may operate through psychophysiological means but also emphasised the evidence from psychoneuroimmunology and psychoneuroendocrinology which indicates pathways exist by which stress may directly influence immunological and endocrine functioning. All three of conceptualisations also emphasise the work of Jordan and Whitlock (1972, 1974) on the conditioning of scratch responses in atopic dermatitis to suggest that stress and anxiety may mediate skin symptoms through conditioning.

While the three conceptualisations therefore agree that stress may exacerbate skin symptoms in atopic dermatitis and even such pathways by which it might exert its effect, limited evidence exists to support an association between stress and atopic dermatitis. The results of the first two studies provide stronger evidence that such an association exists and, therefore, that the conceptualisations are correct in their inclusion of stress as a major determinant of the course of the disorder.

However, none of the conceptualisations have considered stress from Lazarus' (Folkman & Lazarus, 1980) transactional perspective. The second study attempted such an examination but was unsuccessful due to limited subject numbers. The transactional perspective is the dominant perspective of stress currently in existence and, therefore, the three conceptualisations would be advanced by research investigating atopic dermatitis from this perspective. As reviewed in chapter 3, some research has been conducted on appraisal and coping processes and their relationship to psychosomatic symptoms. For example, Billings and Moos (1981) found that coping strategies that involved active avoidance of confronting the problem or those that involved use of behaviours such as eating or smoking more to reduce tension were significantly related to occurrence of symptoms. For both men and women, use of social support and, for women only, use of active cognitive coping was associated with reductions in symptoms. Vingerhoets and Menges (1989) found similar results. Subjects reporting high symptom levels tended to utilise the coping strategies of self-blame, daydreaming and fantasies, and wishful thinking and emotionality. Vingerhoets and Van Heck (1990) found that strategies involving planning and rational action, and positive thinking were associated with fewer symptoms. Whether these

same relationships occur in atopic dermatitis is unclear at this stage. Due to the lack of success of the study reported in chapter 3 in investigating appraisal and coping processes in atopic dermatitis, this area remains to be explored.

With regard to personality and emotional factors in atopic dermatitis, Whitlock (1976) and Faulstich and Williamson (1985) stated that any traits associated with the disorder are a result rather than cause of the condition. Whitlock (1976) stated, however, that an individual's personality may make them more susceptible to stress. Both of these perspectives acknowledged the findings of raised anxiety levels in atopic dermatitis sufferers. Whitlock (1976) concluded the anxiety was originally the result of the disorder rather than a cause. However, over time a vicious cycle is created whereby anxiety provoked itching and itching and scratching in turn led to increases in anxiety. Faulstich and Williamson (1985) felt that anxiety and stress may lead to conditioned scratching of lesions that have developed as a consequence of pathophysiological factors such as allergic reactions. They also concluded that stress and anxiety may lead to the pathophysiological mechanism through sympathetic arousal.

Koblenzer (1987, 1988), on the other hand, placed great importance on personality and psychodynamic factors in atopic dermatitis. She identified no consistent personality pattern in her patients but felt there was a greater association between atopic dermatitis and obsessive-compulsive neurosis than with hysterical neurosis, and a decreased association with personality disorders or psychosis. Suppression of aggression was a common finding in her patients as a consequence of a disturbed mother-child relationship but this feature was not felt to be unique to the disorder.

For Koblenzer (1987, 1988) the mother-child relationship was of key importance. Following the work of Spitz (1951) and others, she viewed the mothers of atopic children as being superficially anxious regarding the health and care of their infants. However, this anxiety was a defence against unconscious hostility that the mother was apt at times to reveal, sending the child confusing and inconsistent messages. Koblenzer felt that this maternal ambivalence was reflected in a lack of strict controls on the child. The consequences of this disturbed mother-child relationship was the development of anxiety in the child, suppression of aggression, and the eroticism being centred in the skin.

The literature review and meta-analysis reported in chapter 4 provides a starting point for evaluating the validity of the viewpoints of the three conceptualisations with regard to personality and emotional factors. First, this review found that those studies supportive of a disturbed mother-child relationship (e.g., Marmor et al., 1956; Miller & Baruch, 1948; Spitz, 1951) were flawed methodologically. A well-designed study by C. Solomon and Gagnon (1987) utilising independent observers and repeated

observations found no support for maternal rejection or hostility in the mothers of atopic children. A. Allen (1989) criticised Koblenzer's view of the mother as ambivalent and hostile. He felt that poor parenting was secondary to depression in the mother, a view rejected by Koblenzer (Koblenzer & Koblenzer, 1989) who stated that none of her mothers were depressed. On the whole, these studies do not appear to provide strong evidence in favour of a disturbed mother-child relationship.

All three of the perspectives stated there was no single personality type associated with atopic dermatitis. The studies reviewed in chapter 4 support this contention. However, there was evidence of two subgroups of personality. A number of researchers (e.g., D.G. Brown, 1967, 1972; Kalz et al., 1954, Kepecs, Rabin, & Robin, 1951; Whittkower & Edgell, 1951) described similar subgroups; one showing a tendency towards emotional constriction, and denial of anger or hostility, the other showing a tendency towards a more emotionally reactive pattern. None of the three perspectives considered the issue of these subgroups. This point will be returned to shortly.

With regard to emotional factors in atopic dermatitis, all of the conceptualisations pointed to raised levels of anxiety in atopic dermatitis sufferers. A number of studies reviewed (e.g., Al-Ahmar & Kurban, 1976, Endicott, 1965; Garrie et al., 1974) found that the atopic dermatitis sufferers were more anxious than both nonpsychogenic dermatological controls and normal controls while Greenhill and Finesinger (1942) found no difference between the skin disorder groups. Other studies found them to be more depressed (Al-Ahmar & Kurban, 1976; Endicott, 1965) and more intrapunitive (Endicott, 1965; Greenhill & Finesinger, 1942) than these groups. However, the findings of higher anxiety, depression, and hostility levels in psoriasis (Baldaro et al., 1984; Lyketos et al., 1985) and urticaria and alopecia (Lyketos et al., 1985) sufferers compared to controls suggest that these features are common to other psychosomatic skin disorders. Koblenzer (1987, 1988) had identified her patients as showing more obsessive-compulsive patterns, a point supported by Faulstich et al. (1985). However, Greenhill and Finesinger (1942) found this was a feature of their lupus erythematosus patients as well and felt it reflected a consequence of the disorder.

Therefore, these results suggest that anxiety, depression, and suppressed aggression are not only features of atopic dermatitis but also of other psychosomatic skin disorders. To some extent, this supports the contention of Whitlock (1976) and Faulstich and Williamson (1985) that these features are consequences of the disorder. This is supported by the findings of Jowett and Ryan (1985) who found anxiety and depression to be experienced by sufferers of skin conditions in response to their disorder. However, this does not explain why nonpsychogenic dermatological conditions failed to report similarly raised levels. The meta-analytic review by H. Friedman and Booth-Kewley (1987) suggested the existence of a disease-prone

personality with the features of raised anxiety, depression, and hostility levels. This may explain the discrepancy. Furthermore, these factors all show a relationship to neuroticism. Therefore, the level of neuroticism is the pivotal feature. The evidence regarding this is unclear, though. While Sainsbury (1960) had shown that neuroticism levels were raised in psychosomatic conditions but not nonpsychosomatic, Bendien (1963) found little difference between psychosomatic and nonpsychosomatic groups.

The study described in chapter 5 sought to examine the presence of personality and emotional factors in atopic dermatitis sufferers compared to skin disorder controls and skin disorder free controls in an effort to address these issues. The results of this study supported the existence of subgroups of atopic dermatitis based on differences in self-report of anxiety, dependency, locus of control over social systems, and neuroticism. Closer examination revealed that neuroticism was the pivotal factor in the difference between these subgroups, supporting the findings of D.G. Brown (1967, 1972). The study failed to find the hypothesised differences in the personality or emotional factors between atopic dermatitis sufferers, either as subgroups or as a whole, and skin disorder free controls (the one exception being the lower neuroticism of the nonstress atopic subgroup). This did not support the findings of the psychometric test studies and meta-analytic review of chapter 4. It was suggested that the raised neuroticism level of the control subjects was the reason for this lack of difference.

Taken together, these results have several implications for the psychobiological conceptualisations. First, they support the contention of the perspectives that there is no one personality type associated with atopic dermatitis. Second, they support the findings of previous research that suggests there may be distinct subgroups of atopic dermatitis sufferers that revolve around levels of neuroticism. This has not been addressed by any of the conceptualisations. Third, the study failed to confirm the raised anxiety levels purported by the conceptualisations to occur in atopic dermatitis sufferers compared to normal controls or nonpsychogenic dermatological controls. Fourth, it failed to support the presence of suppressed aggression in atopic dermatitis sufferers as suggested by Koblenzer (1987, 1988). While the stress atopic subgroup did have the highest levels of intraggression of the four groups, the difference between this subgroup and the skin disorder free controls was nonsignificant. Because of the interrelationships between anxiety, dependency, intraggression, and neuroticism, the absence of differences between these the atopic dermatitis sufferers and the skin disorder free controls may be due to the latter groups raised neuroticism levels. This possibility needs to be investigated further.

All three of the conceptualisations suggested that stress may exert its effects through psychophysiological mechanisms. Faulstich and Williamson (1985) and Koblenzer (1987, 1988) focused on increased sympathetic arousal as a potential

pathway. Such a pattern of reactivity in atopic dermatitis was first demonstrated by Wenger et al. (1962). Faulstich et al.'s (1985) own research suggested that evidence for increased sympathetic arousal existed in the form of delayed recovery after stressors such as the cold pressor. Koblenzer (1987, 1988) argued that increased sympathetic tone was consistent with Sventivanyi's (1968) beta-blockade theory and would result in greater increases in alpha-adrenergic and cholinergic activity. This greater activity would lead to greater histamine release and consequently, the development of pruritus. As indicated in chapter 6, the evidence for greater sympathetic activity in atopic dermatitis sufferers, either in the form of resting levels or reactivity, was limited. The psychophysiological study described in that chapter did not find increased resting levels of sympathetic activity in atopic dermatitis but did find partial support for increased sympathetic reactivity in response to a stressful task. Therefore, the inclusion of sympathetic arousal as a potential mechanism for stress in these two conceptualisations was partially supported.

Whitlock (1976) felt that stress may alter the abnormal pharmacological state of the atopic skin by influencing the allergic response, by reducing itch thresholds through vasodilatation and sweating, or through some central process. He pointed to the observations of D.T. Graham and Wolf (1953) on the vasodilatation in the skin of atopic dermatitis sufferers when discussing emotional arousing topics. He felt that the lowering of itch thresholds associated with vasodilatation noted by D.T. Graham, Goodell, and Wolff (1957) was mediated by the release of histamine and proteinases in the skin in response to the emotional arousal rather than a direct vasodilatory effect by sympathetic innervation. The finding in the study reported in chapter 6 of an increase in arm skin temperature at the site of affected skin in response to a stressful task is consistent with vasodilatation. Therefore, this finding is consistent with both the work of D.T. Graham and Wolf (1953) and Whitlock's (1976) conceptualisation. As histamine leads to an increase in skin temperature and the rise in response to histamine is greatest in body areas where atopic dermatitis is most common (Williams, 1938), both Whitlock (1976) and Koblenzer (1987, 1988) may be correct as to the mechanism by which this rise occurs.

None of the conceptualisations discussed psychophysiological processes involved in atopic dermatitis in terms of symptom specificity. Evidence for this pattern of reactivity reviewed in chapter 6 has been found for other disorders such as hypertension (Engel & Bickford, 1961; Fredriksen et al., 1985), and asthma (Levenson, 1979). As mentioned earlier in this chapter, the evidence for symptom specificity in atopic dermatitis is limited. However, the psychophysiological study reported in chapter 6 provides partial support for its existence. Greater reactivity in the atopic dermatitis sufferers on the mental arithmetic task was not restricted to heart rate but was also reflected in arm skin temperature and finger blood flow. This result

suggests that not only does there exist an individual response specificity pattern of greater sympathetic reactivity as proposed by Faulstich and Williamson (1985) and Koblenzer (1987, 1988) but that a symptom specificity pattern also exists. If further evidence could be found for this symptom specificity, the current conceptualisations would require reviewing.

In summary, all three conceptualisations received some support from this series of studies. All three had considered stress to affect the course of the disorder and support was found for this contention in the first two studies. Faulstich and Williamson (1985) and Koblenzer (1987, 1988) had postulated that atopic dermatitis sufferers displayed increased sympathetic reactivity and partial support was found for this. Whitlock (1976) stated that stress and emotional factors may lead to the release of proteinases and histamine that would result in vasodilatation in the affected skin. Evidence of a rise in arm skin temperature in response to a stressful task is consistent with this statement.

The evidence from the literature review and meta-analysis of personality and emotional factors suggested that there were distinct features associated with atopic dermatitis. This was contrary to the views of all three conceptualisations. However, the experimental study in chapter 5 found no such differences, which supported the conceptualisations.

The three conceptualisations were not supported entirely, though. Koblenzer's (1987, 1988) emphasis on the mother-child relationship has little solid support in the literature. While her argument that atopic dermatitis sufferers often display suppressed anger was consistent with the reviews of previous research, it was not supported by the findings of the experimental study. Neither was Whitlock (1976) and Faulstich and Williamson's (1985) assertion that atopic dermatitis sufferers displayed raised anxiety levels. However, possible reasons for this finding were suggested.

Two important findings of this series of studies have not been considered by the conceptualisations. First, there is the finding that distinct subgroups of atopic dermatitis exist; one displaying a constriction of emotional expression and the other freedom of such expression. Such a finding was consistent with the previous literature, particularly the findings of D.G. Brown (1967, 1972). Second, there is the finding of a symptom specificity pattern in the psychophysiological reactivity of atopic dermatitis sufferers. These findings require further investigation but may mean that the existing conceptualisations need to be revised.

#### *Implications of findings with regard to Lipowski's biopsychosocial perspective*

The three conceptualisations of atopic dermatitis have, in their present form, included many of the elements listed by Lipowski (1977) as the major influences on modern psychosomatic theory. They all emphasise the multicausality of atopic dermatitis and the role played by psychosocial stress. The current research has



provided stronger evidence that psychosocial stress affects the course of the disorder. However, while all three of the conceptualisations have emphasised the role of psychosocial stress in affecting the course of the disorder, none have considered stress from the point of view of appraisal and coping processes. Indeed, little research has been directed to the role of these processes in psychosomatic disorders (e.g., Billings & Moos, 1981; Vingerhoets & Menges, 1989; Vingerhoets & Van Heck, 1990). In line with this perspective's current prominence, the study reported in chapter 4 attempted to investigate these processes and their relationship to symptoms in atopic dermatitis but was unsuccessful. Further investigation is warranted to examine whether a positive relationship exists between coping strategies involving self-blame and avoidance and symptoms in atopic dermatitis and whether more active problem-focused and positive reappraisal strategies are negatively related to symptoms (Billings & Moos, 1981; Vingerhoets & Menges, 1989).

All of the perspectives acknowledge the work of Jordan and Whitlock (1972, 1974) demonstrating that operant principles of conditioning explain the development of scratching behaviour in the disorder. The demonstration of the effectiveness of behaviour therapy interventions to eliminate scratching (e.g., Cataldo et al., 1980; Horne et al., 1989; Melin et al., 1986; D.L. Watson et al., 1972) further strengthen the argument that operant factors are of importance to the disorder.

Koblenzer (1987, 1988) and Faulstich and Williamson (1985) have addressed the issue of psychophysiological response specificity. They postulated that an individual response stereotypy pattern existed in the form of increased sympathetic arousal. Previous research provided evidence consistent with this view and the current research has provided more evidence in favour of such a pattern. It has also provided partial support for the existence of another pattern of psychophysiological response specificity in the form of symptom specificity. This pattern has had some support in the past but has not been addressed by the conceptualisations.

Koblenzer (1987, 1988) is the only one who adopted psychodynamic concepts into her conceptualisation. Lipowski (1977) identified object loss as an antecedent of disease as one of the major influences on modern psychosomatic theory. While Koblenzer identified a disturbed mother-child relationship as being of importance, a review of the literature found that studies providing empirical evidence for this were flawed methodologically. The one objective, well-designed study (C. Solomon & Gagnon, 1987) did not support this contention. Furthermore, Faulstich and Williamson (1985) found that two studies that examined the incidence of broken homes (which would result in object loss) in atopic children (Rechardt, 1970; Lomholt, cited in Faulstich and Williamson, 1985) found conflicting results.

None of the three conceptualisations have included self-control of visceral functions in their perspectives. This is surprising considering the emphasis placed on the presence of increased sympathetic arousal by Faulstich and Williamson (1985) and Koblenzer (1987, 1988) which was partially supported by the current series of studies. It is also surprising given that a number of studies have successfully employed EMG biofeedback in the treatment of atopic dermatitis (S.G. Gray & Lawlis, 1982; Haynes et al., 1979; McMenamy et al., 1988; Schandler, 1978). Given the finding in the psychophysiological study reported in this thesis of decreased blood flow to the finger and a rise in arm skin temperature at the site of the affected skin in response to a stressful task, there is value in investigating the effectiveness of biofeedback procedures related to these variables. Research on normals has indicated that control of skin temperature of the finger is possible (e.g., Keefe, 1975; Libo & Fehmi, 1977; Ohno, Tanaka, Takeya, & Ikemi, 1977; Roberts, Kewman, & MacDonald, 1973). It is possible that such control could be extended to body areas affected by skin symptoms.

In summary, the series of studies reported in this thesis are consistent with Lipowski's biopsychosocial perspective. The thesis has acknowledged that psychological factors are only one of a number of factors influencing atopic dermatitis. This upholds the principle of multicausality. The studies themselves investigated and provided evidence for the role of psychosocial stress, and psychophysiological response specificity in atopic dermatitis in the form of individual response stereotypy and symptom specificity. They also attempted to investigate the role of appraisal and coping in the disorder. The results of the studies supports Lipowski's assertion that these are major influences on modern psychosomatic theory.

#### *Implications of results on the treatment of atopic dermatitis*

The findings of the current series of studies have significant implications for the treatment of atopic dermatitis. The evidence presented in the first two studies regarding the relationship between psychosocial stress and increases in skin symptoms indicates that psychological interventions are potentially important. This could occur in a number of ways. These interventions may be directed towards either resolution of the sources of this stress or improvement in a person's capability to manage future stress through counselling or psychotherapy. Previous research indicates that such interventions are effective (e.g., D.G. Brown & Betteley, 1971; Cormia, 1951; Schoenberg & Carr, 1963). Second, interventions may be directed to reduce the effects of stress such as increased physiological arousal. Such interventions are supported by the findings of the psychophysiological study which found evidence of increased sympathetic arousal. A body of evidence exists that supports the effectiveness of such interventions. Relaxation therapy with biofeedback (S.G. Gray & Lawlis, 1982; Haynes et al., 1979; McMenamy et al., 1988), in combination with

cognitive and behavioural interventions (Cole et al., 1988; Horne et al., 1989, Ratcliff & Stein, 1968), and hypnosis (Brown & Betteley, 1971) have all proved beneficial. Such an intervention would also be consistent with the findings of Gannon et al. (1989) reported earlier. As was mentioned previously, the finding in the psychophysiological study of decreased blood flow to the finger and a rise in arm skin temperature at the site of the affected skin in response to a stressful task suggests there is value in investigating the effectiveness of biofeedback procedures related to these variables. Such an approach would deal directly with the physiological consequences of arousal.

In the first study, anxiety and tension displayed a greater, albeit nonsignificantly greater, relationship to increases in skin symptoms. Jordan and Whitlock (1972, 1974) demonstrated the mediating role that anxiety may play in the conditioning of scratching responses in atopic dermatitis. Therefore, the results of the first study is consistent with this work and provides justification for the value of behavioural interventions directed towards eliminating or reducing scratching behaviour. Previous research indicates that these interventions are effective. These interventions have utilised aversive therapy (Ratcliff & Stein, 1968), and habit reversal or response substitution (Cataldo et al., 1980; Cole et al., 1988; Horne et al., 1989; Melin et al., 1968; Rosenbaum & Ayllon, 1981; D.L. Watson et al., 1972). Interventions utilising social reinforcement have also proved effective (K. Allen & Harris, 1966; Bar & Kuypers, 1973; E. Carr & McDowell, 1980; Dobes, 1977; Latimer, 1979a; Walton, 1960; D.L. Watson et al., 1972).

Therefore, the results of this series of studies are consistent with the value of psychological interventions in the treatment of atopic dermatitis. As discussed above, such interventions may take a variety of forms. Investigations in the future should aim to evaluate which approaches are the most effective for which patients. For example, personality factors may be important in determining which treatments are suitable. The finding of the studies reported in chapter 5 and chapter 2 are relevant. One subgroup of atopic dermatitis sufferers were found to report low levels of neuroticism, dependency, anxiety, and tended to deny the role of stress in the course of their disorder despite evidence of an association. This suggests that such individuals may be unsuitable for psychological type interventions due to their denial of strong emotional states and the role of stress in the course of their disorder. This is worthy of investigation in future studies.

#### *Areas requiring research in the future*

The discussion in this chapter has so far identified a number of areas where further research should be directed as a consequence of these findings. These and others will now be outlined.

With relation to the diary studies, some extensions of this work would be of benefit. First, repeating the diary study utilising the Stress- Arousal Checklist as the measure of stress may lead to evidence of greater overall levels of association between skin symptoms and stress. This is due to the more general measurement of stress adopted by this checklist in comparison to the Psychological Diary of Robbins et al. (1974). The diary limited its measurement of stress to interpersonal situations and, as the results of the second study suggested, this may be too narrow. Second, the examination of the stress-skin symptom relationship in a diary-type study incorporating more objective measures of skin symptoms such as cortisone cream and antihistamine usage as utilised by Gil et al. (1987) would be worthwhile as a means of removing the reliance on self-report of both symptoms and stress. Third, examining the relationship between perceived stress, skin symptoms, and various markers of immunological functioning would integrate the biological and psychological perspectives towards atopic dermatitis. As discussed in chapter 1, many immunological deficits have been identified in atopic dermatitis. The appropriate markers would be those that were identified in chapter 2 as being influenced by stress as well as relevant to deficits in atopic dermatitis. For example, glucocorticosteroids are produced in increasing quantities when an individual is under stress. These glucocorticosteroids are known to depress cellular activity, reduce blood levels of lymphocytes, and inhibit non-specific T-cell mitogenic responses to phytohemagglutinin and concanavalin A. All of these functions are depressed in atopic dermatitis. Such investigations are consistent with Koblenzer's (1987, 1988) conceptualisation which states that immunological pathways are an obvious pathway by which stress may affect skin symptoms. Therefore, this is an area worthy of investigation.

Earlier in this chapter, it was suggested that the relationship between stress and atopic dermatitis should be investigated in terms of the transactional approach of Lazarus (Folkman & Lazarus, 1980). Research conducted previously (Billings & Moos, 1981; Vingerhoets & Menges, 1989; Vingerhoets & Van Heck, 1990) has identified patterns of coping strategies associated with increased psychosomatic symptoms. Vingerhoets and Van Heck (1990) have also identified coping strategies adopted by individuals in response to psychosomatic symptoms. It would be interesting to examine whether similar relationships occur between appraisal and coping processes and skin symptoms in atopic dermatitis.

Further psychophysiological studies are also worth conducting. There is a need to further investigate the existence of increased sympathetic arousal in atopic dermatitis. The study in this series provided partial support for its existence. Further research could examine reactivity to other stressors. For example, Hastrup et al. (1982) report that previous research by their group (Obrist et al., cited in Hastrup et al., 1982) found that performing a reaction time task with the threat of electric shock for slow

performance evoked large changes in heart rate and systolic blood pressure, both of which are mediated by the sympathetic nervous system. However, increased reactivity to such tasks is only one indicator of increased sympathetic arousal. Delayed recovery to tasks was not investigated in the study reported in chapter 6 but evidence exists to support its existence in atopic dermatitis (e.g., Eyster et al., 1952; Faulstich et al., 1985; Johnson & Winkelmann, 1965). Inclusion in these studies of variables related to the skin and peripheral vascular system will also enable further evidence of symptom specificity patterns to be investigated.

Of related interest would be a psychophysiological study examining responses of subjects whilst discussing topics that aroused specific emotions such as anger, frustration and so on. This would enable the observations of D.T. Graham and Wolf (1953) of vasodilatation in response to discussion of frustrating situations to be replicated and extended. Evidence of increased sympathetic arousal in the form of reactivity or delayed recovery could be examined for these conditions.

Following on from the findings of Gannon et al. (1989), it would be of interest to examine the relationship between recent stress, reactivity and delayed recovery to a laboratory stressor, and skin symptoms in atopic dermatitis sufferers. If Gannon et al.'s findings are correct, one might predict that atopic dermatitis sufferers who display greater reactivity or delayed recovery would show the greatest association between stress and symptoms. Therefore, such an investigation may provide important information from both a theoretical and treatment perspective.

Finally, further investigations on the personality and emotional features of atopic dermatitis sufferers is warranted. This is particularly true with regard to the two subgroups of sufferers identified in the study in chapter 5. An initial line of investigation would be the determination of other factors on which the subgroups differ. Extending upon this, the implications of the subgroups could be investigated. As mentioned above, one subgroup of atopic dermatitis sufferers were found to report low levels of neuroticism, dependency, anxiety, and tended to deny the role of stress in the course of their disorder despite evidence of an association. This suggests that such individuals may be unsuitable for psychological type interventions due to their denial of strong emotional states and the role of stress in the course of their disorder. Studies investigating interventions could examine this issue. The relationship of these features to appraisal and coping processes in atopic dermatitis could also be investigated. As reviewed in chapter five, some evidence exists to suggest that personality factors may influence appraisal and coping processes (Fleishman, 1984; Van Heck & Vingerhoets, cited in Vingerhoets & Van Heck, 1990). Such an investigation would serve to integrate these areas of interest.

Therefore, the results of the current series of studies have provided some further insights into the psychological aspects of atopic dermatitis but have also raised further questions that deserve investigation. As these questions are answered, the psychobiological conceptualisations of atopic dermatitis will require revision.

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ARTICLES  
AND  
PRESENTATIONS

*Article*

King, R. M., & Wilson, G.V. (1991), Use of a diary technique to investigate psychosomatic relations in atopic dermatitis. *Journal of Psychosomatic Research*, 35, 697- 706.

*Presentation*

King, R. M. (1989, September) *Use of a diary technique to investigate psychosomatic relations in atopic dermatitis*. Paper presented at the 23rd Annual Conference of the Australian Psychological Society, Hobart, Tasmania.

APPENDICES

## Appendix A

*Psychological Diary Utilised in Study One*MEDICAL PERSONAL DIARY

The diary asks you a number of questions about your state of health and also about your daily life- what you are doing and feeling. All questions have to do with what happened to you today, that is, up until the time you began filling out this diary. Most questions ask you to answer YES or NO, by circling the appropriate letter next to the question. If you answer YES to a question about feeling a certain emotion (the starred \* questions), could you indicate how strongly you felt this emotion on a three point scale.

1.....A Little

2.....Somewhat

3.....A Great Deal

For instance, for the question "Did you feel tense or anxious today?", you may respond YES 3, meaning you felt very anxious today.

There are dotted spaces underneath these questions which you can use to elaborate on your YES answers. Use these spaces to describe in more detail what happened to you- whenever you feel the event or situation seemed important or might shed light on what you were experiencing. For example, you may have felt tense in the above question because of an argument you had with your spouse, so you could write, "Had fight with wife over her spanking youngest child."

Try to fill the diary in just before going to bed each night for the next FORTNIGHT. Do not skip days or try to remember how you felt the previous day as this will lead to errors. Fill in the date at the top of each page. When you have finished the month of recording, place the diary in the large addressed envelope and mail it back. The postage has been prepaid. THANK-YOU FOR YOUR COOPERATION.

YOUR DIARIES WILL BE KEPT IN STRICT CONFIDENCE.

Date \_\_/\_\_/\_\_

- 1.....A Little
- 2.....Somewhat
- 3.....A Great Deal

\*Did you EXPRESS feelings of anger or annoyance to anyone today? Y N

---

---

---

Did you find yourself in a situation, today, when you had to defend yourself? Y N

\*Did you FEEL angry or annoyed today? Y N

---

---

---

Did anyone give you a "hard time" or make life difficult for you today? Y N

\*Did you feel rebuffed or hurt by someone today? Y N

---

---

---

\*Did you feel trapped in an uncomfortable situation that you wanted to get out of? Y N

---

---

---

\*Did you experience a feeling of defeat or frustration today? Y N

---

---

---

\*Did you feel lonely or isolated? Y N

---

---

---

**\*Did you feel tense or anxious?**

Y N

---

---

---

**\*Did you at any time feel depressed today?**

Y N

[illegible]

Did you have a feeling you wanted to seek help from someone in solving some of your problems?

Y N

At times, everyone has things on their mind, problems that are not resolved, thoughts that might be nagging at them. Are you in this mental state now?

**Y N**

**Did you find yourself daydreaming at times?**

**Y      N**

**Did you seek a period of isolation and solitude away from other people?**

**Y      N**

**Did you feel that other people were intruding into your privacy?**

**Y N**

How much pleasure or satisfaction did you feel in your social interactions today? (Tick)

## A Great Deal

## A Fair Amount

### A Little or None

**Did you get together with friends or family today?**

**Y N**

**Did someone express feelings of love or affection to you?**

**Y N**

Did you have any of these complaints today? (Tick)

## Nausea

## Dizziness

## Head Cold

### Weakness

## Headache

## Skin Flare-up

## Back Pain

## Diarrhea

**If you answered yes to "Skin Flare-up, indicate how bad your skin is now. (Tick)**

## A Little

**Moderately**

**Severe**

Appendix B  
*Biographical Information Sheet Completed by Subjects*

SUBJECT NO..... AGE..... SEX.....

How old were you when you first suffered from your skin problem?  
How long did it last?

.....  
Was this outbreak related to some important event? (eg. change of school, moving house, etc.)

.....  
How many times has your skin problem returned?.....

Have any of these times been due to stressful events?.....  
.....

Have you a family history of this skin problem?.....

Who did it affect (circle)  
sisters/brothers    parents    grandparents    aunts/uncles

Do you suffer from, or have suffered from (circle)  
Asthma    Hayfever    Urticaria/Hives

What areas of your body are normally affected by your skin problem?

.....  
.....

In severe attacks, are other areas affected?

.....  
.....

What treatments have you tried in the past?

.....  
.....  
.....

DATE.....

DID YOU HAVE AN EXAM TODAY? YES NO

Did you FEEL angry or annoyed today? Y N

Did you EXPRESS feelings of anger or annoyance to anyone today? Y N

Did you find yourself in a situation today when you had to defend yourself? Y N

Did anyone give you a "hard time" or make life difficult for you today? Y N

Did you feel rebuffed or hurt by someone today? Y N

Did you feel trapped in an uncomfortable situation that you wanted to get out of? Y N

Did you experience a feeling of defeat or frustration today? Y N

Did you feel tense or anxious today? Y N

Did you feel lonely or isolated? Y N

Did you at any time feel depressed today? Y N

Did you have a feeling you wanted to seek help from someone in solving some of your problems? Y N

At times, everyone has things on their mind, problems that are not resolved, thoughts that might be nagging at them. Are you in this mental state now? Y N

Did you find yourself daydreaming at times? Y N

Did you seek a period of isolation and solitude away from other people? Y N

Did you feel that other people were intruding into your privacy? Y N

How much pleasure or satisfaction did you feel in your social interaction today? (Tick)

A GREAT DEAL A FAIR AMOUNT A LITTLE OR NONE

Did you get together with family and friends today? Y N

Did someone express feelings of love or affection to you? Y N

Did you have any of these complaints today? (Tick)  
Nausea Dizziness Head Cold Weakness

Headache Skin Flareup Back Pain Diarrhoea

If you answered YES to Skin Flareup indicate how bad your skin is now.

A LITTLE MODERATELY SEVERE

Please answer each of the following questions according to how you feel right now. Answer each item by marking the response to indicate:

If the answer is  
Definitely yes ++  
Slightly yes +  
Not sure or Don't understand ?  
Definitely not -

Calm	++	+	?	-	Distressed	++	+	?	-
Contented	++	+	?	-	Uptight	++	+	?	-
Active	++	+	?	-	Drowsy	++	+	?	-
Vigorous	++	+	?	-	Tense	++	+	?	-
Comfortable	++	+	?	-	Relaxed	++	+	?	-
Lively	++	+	?	-	Passive	++	+	?	-
Uneasy	++	+	?	-	Energetic	++	+	?	-
Tired	++	+	?	-	Alert	++	+	?	-
Sleepy	++	+	?	-	Bothered	++	+	?	-
Worried	++	+	?	-	Aroused	++	+	?	-

Now please place a cross (X) to indicate your position along the two lines below.

Respond as you feel right now.

Comfortable or calm \_\_\_\_\_ worried

active \_\_\_\_\_ sleepy



Below is a list of reasons why exams can be stressful. Please indicate how much each item applies to you by circling the appropriate number.

- In this exam there is a possibility of:

- How difficult do you think this exam will be? (CIRCLE)

- How much in control do you feel now about this exam? (CIRCLE)

- How much do each of these emotions apply to you now at this moment, with regard to the exam? (CIRCLE)

- 0.....Not at all  
1.....A little  
2.....Moderately so  
3.....Quite a lot  
4.....A great deal

- |              |   |   |   |   |   |
|--------------|---|---|---|---|---|
| Worried      | 0 | 1 | 2 | 3 | 4 |
| Fearful      | 0 | 1 | 2 | 3 | 4 |
| Anxious      | 0 | 1 | 2 | 3 | 4 |
| Confident    | 0 | 1 | 2 | 3 | 4 |
| Hopeful      | 0 | 1 | 2 | 3 | 4 |
| Eager        | 0 | 1 | 2 | 3 | 4 |
| Angry        | 0 | 1 | 2 | 3 | 4 |
| Sad          | 0 | 1 | 2 | 3 | 4 |
| Disappointed | 0 | 1 | 2 | 3 | 4 |
| Guilty       | 0 | 1 | 2 | 3 | 4 |
| Disgusted    | 0 | 1 | 2 | 3 | 4 |
| Exhilarated  | 0 | 1 | 2 | 3 | 4 |
| Pleased      | 0 | 1 | 2 | 3 | 4 |
| Happy        | 0 | 1 | 2 | 3 | 4 |
| Relieved     | 0 | 1 | 2 | 3 | 4 |

## Appendix E

Table E1

*Factor Items, Coefficient Alphas, and Constituent Item Factor Loadings for Ways of Coping Checklist (From Folkman, Lazarus, Dunkel-Schetter et al. [1986] )*

---

Factor 1: Confrontive Coping (alpha = .70)

- 46. Stood my ground and fought for what I wanted. .70
  - 7. Tried to get the person responsible to change his or her mind. .62
  - 17. I expressed anger to the person(s) who caused the problem. .61
  - 28. I let my feelings out somehow. .58
  - 34. Took a big chance or did something very risky. .32
  - 6. I did something which I didn't think would work, but at least I was doing something. .30
- 

Factor 2: Distancing (alpha = .61)

- 44. Made light of the situation; refused to get too serious about it. .55
  - 13. Went on as if nothing had happened. .54
  - 41. Didn't let it get to me; refused to think about it too much. .50
  - 21. Tried to forget the whole thing. .49
  - 15. Looked for the silver lining, so to speak; tried to look on the bright side of things. .34
  - 12. Went along with fate; sometimes I just have bad luck. .25
- 

Factor 3: Self-controlling (alpha = .70)

- 14. I tried to keep my feelings to myself. .55
  - 43. Kept others from knowing how bad things were. .46
  - 10. Tried not to burn my bridges, but leave things open somewhat. .40
  - 35. I tried not to act too hastily or follow my first hunch. .40
  - 54. I tried to keep my feelings from interfering with other things too much. .37
  - 62. I went over in my mind what I would say or do. .37
  - 63. I thought about how a person I would admire would handle the situation and used that as a model. .28
- 

Factor 4: Seeking Social Support (alpha = .76)

- 8. Talked to someone to find out more about the situation. .73
  - 31. Talked to someone who could do something concrete about the problem. .68
  - 42. I asked a relative or friend I respected for advice. .58
  - 45. Talked to someone about how I was feeling. .57
  - 18. Accepted sympathy and understanding from someone. .56
  - 22. I got professional help. .45
-

---

Factor 5: Accepting Responsibility (alpha = .66)

- 9. Criticised or lectured myself. .71
  - 29. Realised I brought the problem on myself. .68
  - 51. I made a promise to myself that things would be different next time. .49
  - 25. I apologised or did something to make up. .39
- 

Factor 6: Escape-avoidance (alpha = .72)

- 58. Wished that the situation would go away or somehow be over with. .66
  - 11. Hoped that a miracle would happen. .55
  - 59. Had fantasies about how things might turn out. .54
  - 33. Tried to make myself feel better by eating, drinking, smoking, using drugs or medication, and so forth. .49
  - 40. Avoided being with people in general. .46
  - 50. refused to believe that it had happened. .42
  - 47. Took it out on other people. .40
  - 16. Slept more than usual. .36
- 

Factor 7: Planful Problem-solving (alpha = .68)

- 49. I knew what had to be done, so I doubled my efforts to make things work. .71
  - 26. I made a plan of action and followed it. .61
  - 1. Just concentrated on what I had to do next- the next step. .45
  - 39. Changed something so things would turn out all right. .44
  - 48. Drew on my past experiences; I was in a similar position before. .40
  - 52. Came up with a couple of different solutions to the problem. .38
- 

Factor 8: Positive Reappraisal (alpha = .79)

- 23. Changed or grew as a person in a good way. .79
  - 30. I came out of the experience better than when I went in. .67
  - 36. Found new faith. .64
  - 38. Rediscovered what is important in life. .64
  - 60. I prayed. .56
  - 56. I changed something about myself. .55
  - 20. I was inspired to do something creative. .43
-

Appendix F

Table F1

*Raw Scores for Subjects on Appraisal Questions, Appraisal Emotions, Coping Factors, and Skin Condition, and the Difference From Mean Skin Condition (N = 8).*

Subject Number	Exam Number	Variable						
		Skin	Diff. M Skin	Stakes	Diffi- culty	Control	Threat	Challenge
6	1	4	2.5	9	4	2	6	4
	2	3	1.5	7	2	1	2	4
7	1	2	.25	10	3	2	8	6
	2	3	1.25	9	4	2	7	4
	3	2	.25	11	4	2	9	4
	4	3	1.25	12	5	1	11	4
8	1	1	-.50	4	4	3	6	8
	2	1	-.50	5	4	2	9	2
	3	1	-.50	16	4	0	12	1
	4	2	.50	12	4	1	2	2
9	1	2	0	14	4	2	10	3
	2	3	1.0	14	4	2	7	2
	3	3	1.0	6	5	1	4	4
	4	4	2.0	12	3	3	11	8
	5	3	1.0	16	5	2	3	7
	6	4	2.0	11	4	1	7	4
	7	3	1.0	4	2	3	2	9
10	1	2	-.66	0	1	4	1	10
	2	3	.34	13	5	0	9	6
	3	3	.34	3	2	4	0	11
	4	3	.34	9	3	2	2	6
11	1	3	1.0	2	3	2	5	3
	2	3	1.0	3	4	1	8	4
	3	2	0	2	3	2	3	1
	4	3	1.0	1	1	4	0	7
	5	1	-1.0	3	4	1	2	2
12	1	1	0	7	2	2	6	7
13	1	4	1.5	4	3	1	6	5
	2	3	-.50	4	2	3	3	7
	3	4	1.5	8	5	2	9	5
	4	3	-.50	6	4	1	9	3

Subject Number	Exam Number	Variable						
		Harm	Benefit	WC1	WC2	WC3	WC4	WC5
6	1	0	3	3	5	7	5	2
	2	0	3	4	3	7	3	1
7	1	1	0	1	2	3	8	4
	2	1	0	1	1	4	7	2
	3	2	0	1	1	3	6	2
	4	1	1	3	2	3	6	2
8	1	0	9	3	7	9	5	3
	2	0	3	2	5	7	3	2
	3	11	0	2	4	8	3	3
	4	3	3	3	6	12	0	6
9	1	2	4	5	7	9	10	2
	2	0	5	4	7	6	7	0
	3	3	3	3	7	7	2	1
	4	1	2	5	9	8	2	3
	5	0	12	3	5	9	1	0
	6	3	4	8	7	10	5	2
	7	0	7	5	7	7	3	0
10	1	0	7	6	9	13	5	7
	2	13	0	8	7	14	2	9
	3	0	11	2	11	13	3	2
	4	1	2	1	3	4	1	2
11	1	1	2	1	3	4	1	2
	2	0	2	1	2	0	0	1
	3	0	0	0	1	1	0	0
	4	0	2	0	0	0	0	0
	5	0	0	0	1	0	0	0
12	1	1	8	0	2	2	10	1
13	1	1	3	4	4	8	10	3
	2	0	5	0	4	4	8	1
	3	1	3	3	1	6	9	4
	4	1	1	1	2	5	3	4

Subject Number	Exam Number	Variable		
		WC6	WC7	WC8
6	1	1	9	10
	2	1	7	11
7	1	3	8	1
	2	5	1	9
	3	3	1	9
	4	5	4	1
8	1	8	8	2
	2	8	6	1
	3	8	9	2
	4	8	8	2
9	1	5	6	11
	2	6	10	3
	3	6	11	4
	4	10	13	3
	5	6	12	10
	6	7	10	5
	7	4	13	3
10	1	10	15	9
	2	12	8	12
	3	8	11	9
	4	5	8	8
11	1	7	0	2
	2	4	4	0
	3	4	3	0
	4	3	5	0
	5	3	3	0
12	1	2	3	5
13	1	7	11	2
	2	6	13	2
	3	10	10	2
	4	8	9	2

*Note.* Diff. MSkin = Difference from mean skin score, WC1 -WC8 =Ways of Coping Checklist Factors (Confrontive Coping, Distancing, Self-controlling, Seeking Social Support, Accepting Responsibility, Escape-avoidance, Planful Problem-solving, Positive Reappraisal), respectively.

Appendix G

*Final Steps in Stepwise Analyses Conducted in Study Two*

Table G1

*Emotions Scales with Raw Skin Scores as Criterion Variable*

Stepwise Regression Y<sub>1</sub>:SKIN 9 X variables

(Last Step) STEP NO. 5 VARIABLE ENTERED: X<sub>5</sub>: mben

R: R-squared: Adj. R-squared: Std. Error:

.678	.459	.351	.766
------	------	------	------

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	5	12.445	2.489	4.247
RESIDUAL	25	14.651	.586	
TOTAL	30	27.097		

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STEP NO. 5 Stepwise Regression Y <sub>1</sub> :SKIN 9 X variables				
Variables in Equation				
Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-.178			
• mskin	1.235	.455	.556	7.374
• mthre	.072	.082	.145	.769
• mchall	.063	.156	.105	.164
• mhar	-.391	.12	-.566	10.685
• mben	.075	.098	.163	.58
Variables Not in Equation				
Parameter:	Par. Corr:	F to Enter:		
Threat	.103	.255		

15

STEP NO. 5 Stepwise Regression Y <sub>1</sub> :SKIN 9 X variables		
Variables Not in Equation		
Parameter:	Par. Corr:	F to Enter:
Challenge	.114	.316
Harm	.087	.184
Benefit	-.027	.018

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Table G2  
*Emotions Scales with Difference From Mean Skin Scores as Criterion Variable*

Stepwise Regression Y<sub>1</sub>:dlfskin 8 X variables

(Last Step) STEP NO. 4 VARIABLE ENTERED: X<sub>4</sub>: mben

R: R-squared: Adj. R-squared: Std. Error:

.548	.3	.193	.755
------	----	------	------

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	4	6.353	1.588	2.789
RESIDUAL	26	14.808	.57	
TOTAL	30	21.16		

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STEP NO. 4 Stepwise Regression Y <sub>1</sub> :dlfskin 8 X variables				
Variables in Equation				
Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	.195			
• mthre	.059	.077	.135	.589
• mchall	.112	.123	.21	.825
• mhar	-.39	.118	-.639	10.949
• mben	.054	.088	.133	.373
Variables Not in Equation				
Parameter:	Par. Corr:	F to Enter:		
Threat	.102	.263		
Challenge	.113	.326		

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STEP NO. 4 Stepwise Regression Y <sub>1</sub> :dlfskin 8 X variables		
Variables Not in Equation		
Parameter:	Par. Corr:	F to Enter:
Harm	.087	.19
Benefit	-.027	.018

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Table G3  
Appraisal Questionsand Coping Factors with Raw Skin Scores as Criterion Variable

Stepwise Regression Y1:SKIN 23 X variables				
(Last Step) STEP NO. 12 VARIABLE ENTERED: X12: m8				
R:	R-squared:	Adj. R-squared:	Std. Error:	
.793	.629	.381	.747	

Analysis of Variance Table				
Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	12	17.04	1.42	2.541
RESIDUAL	18	10.057	.559	
TOTAL	30	27.097		

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STEP NO. 12 Stepwise Regression Y1:SKIN 23 X variables				
Variables in Equation				
Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	1.032			
• mskin	2.342	•	1.054	-2.027E-16
• mstake	.104	•	.346	-9.819E-18
• mdiff	-.024	185794894.78	-.014	1.619E-20
• mcont	-1.781	•	-.563	-1.891E-16
• m1	-.256	•	-.461	-3.600E-18
• m2	.283	•	.895	-7.813E-18

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STEP NO. 12 Stepwise Regression Y1:SKIN 23 X variables				
Variables in Equation				
Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
• m3	-.198	56818594.8	-.751	1.216E-17
• m4	.001	•	.003	-8.909E-21
• m5	-.003	39294445.45	-.006	5.980E-21
• m6	-.299	•	-.784	-1.574E-17
• m7	.216	21640702.143	.633	9.969E-17
• m8	.056	•	.207	-1.552E-18
Variables Not in Equation				
Parameter:	Par. Corr:	F to Enter:		
STAKES	.13	.292		

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STEP NO. 12 Stepwise Regression  $Y_1$ :SKIN 23 X variables

## Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
DIFFICULTY	.108	.2
CONTROL	-.029	.014
WC1	.305	1.746
WC2	.237	1.01
WC3	.33	2.074
WC4	-.211	.79
WC5	.225	.908

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STEP NO. 12 Stepwise Regression  $Y_1$ :SKIN 23 X variables

## Variables Not in Equation

Parameter:	Par. Corr:	F to Enter:
WC6	.261	1.246
WC7	.173	.525
WC8	-.29	1.559

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Table G4  
*Appraisal Questions and Coping Factors with Difference from Mean Skin Scores as the Criterion Variable*

Stepwise Regression Y <sub>1</sub> :dlfskin 22 X variables				
(Last Step) STEP NO. 11 VARIABLE ENTERED: X <sub>11</sub> : m8				
R:	R-squared:	Adj. R-squared:	Std. Error:	
.724	.525	.25	.728	

Analysis of Variance Table				
Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	11	11.103	1.009	1.907
RESIDUAL	19	10.057	.529	
TOTAL	30	21.16		

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STEP NO. 11 Stepwise Regression Y <sub>1</sub> :dlfskin 22 X variables				
Variables in Equation				
Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
INTERCEPT	-.075			
• mstake	-.025	37065460.094	-.094	4.568E-19
• mdiff	.326	177378604.104	.213	3.375E-18
• mcont	-.319	183110148.663	-.114	3.032E-18
• m1	.382	162208873.392	.779	5.556E-18
• m2	-.194	37160637.48	-.695	2.733E-17
• m3	-.21	70423254.419	-.9	8.885E-18

53

STEP NO. 11 Stepwise Regression Y <sub>1</sub> :dlfskin 22 X variables				
Variables in Equation				
Parameter:	Value:	Std. Err.:	Std. Value:	F to Remove:
• m4	-.015	20723997.748	-.046	5.035E-19
• m5	.047	48259196.097	.097	9.465E-19
• m6	-.018	*	-.052	-8.228E-20
• m7	.125	57891815.442	.414	4.665E-18
• m8	.161	*	.678	-1.658E-17
Variables Not in Equation				
Parameter:	Par. Corr:	F to Enter:		
WC1	.305	1.849		
WC2	.237	1.069		

54

STEP NO. 11 Stepwise Regression Y <sub>1</sub> :dlfskin 22 X variables		
Variables Not in Equation		
Parameter:	Par. Corr:	F to Enter:
WC3	.33	2.196
WC4	-.211	.837
WC5	.225	.962
WC6	.261	1.32
WC7	.173	.556
WC8	-.29	1.651
STAKES	.13	.309

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STEP NO. 11 Stepwise Regression Y <sub>1</sub> :dlfskin 22 X variables		
Variables Not in Equation		
Parameter:	Par. Corr:	F to Enter:
DIFFICULTY	.108	.212
CONTROL	-.029	.015

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Appendix H  
Table H1

*Correlation Matrix for Appraisal Questions, Coping Factors, Emotions Scales and Skin Symptoms*

	WC1	WC2	WC3	WC4	WC5	WC6	WC7	WC8								
WC1	1															
WC2	.6	1														
WC3	.754	.783	1													
WC4	.091	-.133	.005	1												
WC5	.467	.355	.623	.023	1											
WC6	.52	.457	.659	-.011	.628	1										
WC7	.51	.598	.63	.092	.25	.529	1									
WC8	.586	.566	.673	.063	.312	.149	.34	1	STAKES	DIFFICULTY	CONTROL	Threat	Challenge	Harm	Benefit	SKIN
STAKES	.36	.145	.295	.186	.172	.177	.037	.3	1							
DIFFICULTY	.167	-.102	.072	-.003	.115	.237	-.179	-.038	.585	1						
CONTROL	-.142	.245	.026	.071	-.175	-.022	.306	.023	-.465	-.656	1					
Threat	.153	-.197	-.07	.381	.189	.245	-.179	-.172	.561	.583	-.473	1				
Challenge	.214	.439	.34	.11	.16	.225	.519	.342	-.281	-.515	.699	-.381	1			
Harm	.377	.161	.399	-.111	.562	.427	.012	.238	.497	.349	-.582	.389	-.198	1		
Benefit	.171	.501	.424	.104	-.159	.144	.471	.435	-.089	-.252	.523	-.443	.647	-.341	1	
SKIN	.371	.145	.147	.054	.02	.079	.431	.191	.069	.06	.031	-.005	.193	-.102	-.011	1

Appendix I  
*Repeated Measures Analysis of Variance and MANOVA Summary Tables for  
Relaxation, SpaceInvaders, and Mental Arithmetic Conditions of Study Four*

Type III Sums of Squares

Source	df	Sum of Squares	Mean Square	F-Value	P-Value	G-G	H-F
group	1	2.988	2.988	.171	.6839		
Subject(Group)	19	332.151	17.482				
measures	1	53.723	53.723	3.358	.0826	.0826	.0826
measures * group	1	8.942	8.942	.559	.4638	.4638	.4638
measures * Subject(Group)	19	303.961	15.998				
time	1	69.174	69.174	11.571	.0030	.0030	.0030
time * group	1	.144	.144	.024	.8782	.8782	.8782
time * Subject(Group)	19	113.590	5.978				
measures * time	1	.165	.165	.018	.8950	.8950	.8950
measures * time * group	1	19.910	19.910	2.157	.1583	.1583	.1583
measures * time * Subject(Group)	19	175.413	9.232				

Dependent: relax

Table of Epsilon Factors for df Adjustment  
Dependent: relax

	G-G Epsilon	H-F Epsilon
measures	1.000	1.056
time	1.000	1.056
measures * time	1.000	1.056

NOTE: Probabilities are not corrected for values  
of epsilon greater than 1.

Type III MANOVA Table  
Effect: measures

S 1  
M -.500  
N 8.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	.850	3.358	1.000	19.000	.0826
Roy's Greatest Root	.177	3.358	1.000	19.000	.0826
Hotelling-Lawley Trace	.177	3.358	1.000	19.000	.0826
Pillai Trace	.150	3.358	1.000	19.000	.0826

Type III MANOVA Table  
Effect: measures \* group

S 1  
M -.500  
N 8.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	.971	.559	1.000	19.000	.4638
Roy's Greatest Root	.029	.559	1.000	19.000	.4638
Hotelling-Lawley Trace	.029	.559	1.000	19.000	.4638
Pillai Trace	.029	.559	1.000	19.000	.4638

Type III MANOVA Table  
Effect: time

S 1  
M -.500  
N 8.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	.622	11.571	1.000	19.000	.0030
Roy's Greatest Root	.609	11.571	1.000	19.000	.0030
Hotelling-Lawley Trace	.609	11.571	1.000	19.000	.0030
Pillai Trace	.378	11.571	1.000	19.000	.0030

Type III MANOVA Table  
Effect: time \* group

S 1  
M -.500  
N 8.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	.999	.024	1.000	19.000	.8782
Roy's Greatest Root	.001	.024	1.000	19.000	.8782
Hotelling-Lawley Trace	.001	.024	1.000	19.000	.8782
Pillai Trace	.001	.024	1.000	19.000	.8782

Type III MANOVA Table  
Effect: measures \* time

S 1  
M -.500  
N 8.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	.999	.018	1.000	19.000	.8950
Roy's Greatest Root	.001	.018	1.000	19.000	.8950
Hotelling-Lawley Trace	.001	.018	1.000	19.000	.8950
Pillai Trace	.001	.018	1.000	19.000	.8950

Type III MANOVA Table  
Effect: measures \* time \* group

S 1  
M -.500  
N 8.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	.898	2.157	1.000	19.000	.1583
Roy's Greatest Root	.114	2.157	1.000	19.000	.1583
Hotelling-Lawley Trace	.114	2.157	1.000	19.000	.1583
Pillai Trace	.102	2.157	1.000	19.000	.1583

Type III Sums of Squares

Source	df	Sum of Squares	Mean Square	F-Value	P-Value	G-G	H-F
grp	1	.010	.010	.006	.9391		
Subject(Group)	19	32.565	1.714				
measures	3	74.176	24.725	15.035	.0001	.0001	.0001
measures * grp	3	12.799	4.266	2.594	.0613	.0752	.0621
measures * Subject(Group)	57	93.738	1.645				
time	1	25.156	25.156	74.862	.0001	.0001	.0001
time * grp	1	.337	.337	1.003	.3291	.3291	.3291
time * Subject(Group)	19	6.385	.336				
measures * time	3	77.168	25.723	122.497	.0001	.0001	.0001
measures * time * grp	3	2.130	.710	3.381	.0243	.0287	.0243
measures * time * Subject(Group)	57	11.969	.210				

Dependent: maths

Table of Epsilon Factors for df Adjustment

Dependent: maths

	G-G Epsilon	H-F Epsilon
measures	.811	.987
time	1.000	1.056
measures * time	.906	1.128

NOTE: Probabilities are not corrected for values of epsilon greater than 1.

Type III MANOVA Table  
Effect: measures

S 1

M .500

N 7.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	.183	25.369	3.000	17.000	.0001
Roy's Greatest Root	4.477	25.369	3.000	17.000	.0001
Hotelling-Lawley Trace	4.477	25.369	3.000	17.000	.0001
Pillai Trace	.817	25.369	3.000	17.000	.0001

Type III MANOVA Table  
Effect: measures \* grp

S 1

M .500

N 7.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	.689	2.554	3.000	17.000	.0896
Roy's Greatest Root	.451	2.554	3.000	17.000	.0896
Hotelling-Lawley Trace	.451	2.554	3.000	17.000	.0896
Pillai Trace	.311	2.554	3.000	17.000	.0896



Type III MANOVA Table  
Effect: time

S 1  
M -.500  
N 8.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	.202	74.862	1.000	19.000	.0001
Roy's Greatest Root	3.940	74.862	1.000	19.000	.0001
Hotelling-Lawley Trace	3.940	74.862	1.000	19.000	.0001
Pillai Trace	.798	74.862	1.000	19.000	.0001

Type III MANOVA Table  
Effect: time \* grp

S 1  
M -.500  
N 8.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	.950	1.003	1.000	19.000	.3291
Roy's Greatest Root	.053	1.003	1.000	19.000	.3291
Hotelling-Lawley Trace	.053	1.003	1.000	19.000	.3291
Pillai Trace	.050	1.003	1.000	19.000	.3291

Type III MANOVA Table  
Effect: measures \* time

S 1  
M .500  
N 7.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	.037	149.250	3.000	17.000	.0001
Roy's Greatest Root	26.338	149.250	3.000	17.000	.0001
Hotelling-Lawley Trace	26.338	149.250	3.000	17.000	.0001
Pillai Trace	.963	149.250	3.000	17.000	.0001

Type III MANOVA Table  
Effect: measures \* time \* grp

S 1  
M .500  
N 7.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	.555	4.540	3.000	17.000	.0164
Roy's Greatest Root	.801	4.540	3.000	17.000	.0164
Hotelling-Lawley Trace	.801	4.540	3.000	17.000	.0164
Pillai Trace	.445	4.540	3.000	17.000	.0164

Type III Sums of Squares

Source	df	Sum of Squares	Mean Square	F-Value	P-Value	G-G	H-F
group	1	.890	.890	.462	.5051		
Subject(Group)	19	36.626	1.928				
measures	3	.003	.001	.001	1.0000	.9999	1
measures * group	3	1.489	.496	.294	.8298	.8064	.8298
measures * Subject(Group)	57	96.288	1.689				
time	1	2.779E-4	2.779E-4	.001	.9799	.9799	.9799
time * group	1	.104	.104	.244	.6271	.6271	.6271
time * Subject(Group)	19	8.091	.426				
measures * time	3	.003	.001	.003	.9998	.9976	.9991
measures * time * group	3	1.141	.380	1.324	.2755	.2782	.2777
measures * time * Subject(Group)	57	16.379	.287				

Dependent: space

Table of Epsilon Factors for df Adjustment  
Dependent: space

	G-G Epsilon	H-F Epsilon
measures	.887	1.100
time	1.000	1.056
measures * time	.700	.831

NOTE: Probabilities are not corrected for values  
of epsilon greater than 1.

Type III MANOVA Table  
Effect: measures

S 1  
M .500  
N 7.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	1.000	.001	3.000	17.000	.9999
Roy's Greatest Root	2E-4	.001	3.000	17.000	.9999
Hotelling-Lawley Trace	2E-4	.001	3.000	17.000	.9999
Pillai Trace	1.99E-4	.001	3.000	17.000	.9999

Type III MANOVA Table  
Effect: measures \* group

S 1  
M .500  
N 7.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	.921	.487	3.000	17.000	.6960
Roy's Greatest Root	.086	.487	3.000	17.000	.6960
Hotelling-Lawley Trace	.086	.487	3.000	17.000	.6960
Pillai Trace	.079	.487	3.000	17.000	.6960

Type III MANOVA Table  
Effect: time

S 1  
M -.500  
N 8.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	1.000	.001	1.000	19.000	.9799
Roy's Greatest Root	3.44E-5	.001	1.000	19.000	.9799
Hotelling-Lawley Trace	3.44E-5	.001	1.000	19.000	.9799
Pillai Trace	3.44E-5	.001	1.000	19.000	.9799

Type III MANOVA Table  
Effect: time \* group

S 1  
M -.500  
N 8.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	.987	.244	1.000	19.000	.6271
Roy's Greatest Root	.013	.244	1.000	19.000	.6271
Hotelling-Lawley Trace	.013	.244	1.000	19.000	.6271
Pillai Trace	.013	.244	1.000	19.000	.6271

Type III MANOVA Table  
Effect: measures \* time

S 1  
M .500  
N 7.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	.999	.006	3.000	17.000	.9994
Roy's Greatest Root	.001	.006	3.000	17.000	.9994
Hotelling-Lawley Trace	.001	.006	3.000	17.000	.9994
Pillai Trace	.001	.006	3.000	17.000	.9994

Type III MANOVA Table  
Effect: measures \* time \* group

S 1  
M .500  
N 7.500

	Value	F-Value	Num DF	Den DF	P-Value
Wilks' Lambda	.707	2.352	3.000	17.000	.1085
Roy's Greatest Root	.415	2.352	3.000	17.000	.1085
Hotelling-Lawley Trace	.415	2.352	3.000	17.000	.1085
Pillai Trace	.293	2.352	3.000	17.000	.1085

Appendix J

*Analysis of Variance Summary Tables for the Physiological Variables for the Mental Arithmetic Condition of Study Four*

Type III Sums of Squares

Source	df	Sum of Squares	Mean Square	F-Value	P-Value	G-G	H-F
grp	1	277.757	277.757	1.102	.3069		
Subject(Group)	19	4787.046	251.950				
time	1	493.136	493.136	14.279	.0013	.0013	.0013
time * grp	1	129.871	129.871	3.761	.0675	.0675	.0675
time * Subject(Group)	19	656.160	34.535				

Dependent: hr

Table of Epsilon Factors for df Adjustment

Dependent: hr

	G-G Epsilon	H-F Epsilon
time	1.000	1.056

NOTE: Probabilities are not corrected for values of epsilon greater than 1.

Means Table

Effect: grp

Dependent: hr

	Count	Mean	Std. Dev.	Std. Error
atopic	22	12.009	13.257	2.826
normal	20	6.860	11.241	2.514

Type III Sums of Squares

Source	df	Sum of Squares	Mean Square	F-Value	P-Value	G-G	H-F
grp	1	29.344	29.344	2.832	.1088		
Subject(Group)	19	196.899	10.363				
time	1	1.413	1.413	.833	.3728	.3728	.3728
time * grp	1	10.745	10.745	6.336	.0210	.0210	.0210
time * Subject(Group)	19	32.222	1.696				

Dependent: fbv

Table of Epsilon Factors for df Adjustment  
Dependent: fbv

	G-G Epsilon	H-F Epsilon
time	1.000	1.056

NOTE: Probabilities are not corrected for values of epsilon greater than 1.

Type III Sums of Squares

Source	df	Sum of Squares	Mean Square	F-Value	P-Value	G-G	H-F
grp	1	63.288	63.288	1.575	.2248		
Subject(Group)	19	763.695	40.194				
time	1	60.459	60.459	6.931	.0164	.0164	.0164
time * grp	1	.983	.983	.113	.7408	.7408	.7408
time * Subject(Group)	19	165.746	8.723				

Dependent: cond

Table of Epsilon Factors for df Adjustment  
Dependent: cond

	G-G Epsilon	H-F Epsilon
time	1.000	1.056

NOTE: Probabilities are not corrected for values  
of epsilon greater than 1.

Type III Sums of Squares

Source	df	Sum of Squares	Mean Square	F-Value	P-Value	G-G	H-F
grp	1	.846	.846	3.077	.0955		
Subject(Group)	19	5.221	.275				
time	1	.037	.037	1.159	.2952	.2952	.2952
time * grp	1	.234	.234	7.309	.0141	.0141	.0141
time * Subject(Group)	19	.609	.032				

Dependent: arm temp

Table of Epsilon Factors for df Adjustment  
Dependent: arm temp

	G-G Eps...	H-F Epsilon
time	1.000	1.056

NOTE: Probabilities are not corrected for values  
of epsilon greater than 1.